

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONFIRMING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THEREBY.

#### NOTES:

#### 1. REQUIREMENTS:

- A. THESE RESISTORS SHALL MEET THE GENERAL REQUIREMENTS OF MIL-R-93 WITH THE EXCEPTIONS AND ADDITIONS BELOW.
- B. EXCEPTIONS:
- (1) RATINGS: ALL REQUIREMENTS AT  $25 \pm 2^\circ\text{C}$  WITH INFINITE HEATSINK OR OIL UNLESS SPECIFIED.
  - (2) QUALIFICATION: UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND1002057.
  - (3) DC RESISTANCE: AS SPECIFIED EXCEPT TEST VOLTAGE TO BE  $6.000 \pm 0.001$  VDC FOR DASH 22. FOR DASH 1 THRU 21 THE TEST CURRENT SHALL BE .001 AMP DC.
  - (4) RESISTANCE TOLERANCE: SEE TABLE.
  - (5) TEMPERATURE CYCLING: BETWEEN  $0^\circ\text{C}$  AND  $+50^\circ\text{C}$  WITH NO RESISTANCE CHANGE.
  - (6) SHORT TERM OVERLOAD: NO RESISTANCE CHANGE.
  - (7) DIELECTRIC WITHSTANDING VOLTAGE: NO RESISTANCE CHANGE.
  - (8) SALT WATER IMMERSION: NOT APPLICABLE.
  - (9) LIFE (STABILITY): 100 PPM/YEAR AT 2 HOURS PER DAY OPERATION AT LEAST 10 HOURS BETWEEN OPERATIONS, SAME CONDITIONS AS DC RESISTANCE.
  - (10) RESISTANCE TEMPERATURE COEFFICIENT: 10 PPM/ $^\circ\text{C}$  BETWEEN  $25^\circ\text{C}$  AND  $35^\circ\text{C}$ . SAME CONDITIONS AS DC RESISTANCE.
  - (11) LOW TEMPERATURE STORAGE: NOT APPLICABLE.
  - (12) LOW TEMPERATURE OPERATION: NOT APPLICABLE.
  - (13) HIGH TEMPERATURE EXPOSURE: NOT APPLICABLE.
  - (14) SHOCK: NO RESISTANCE CHANGE.
  - (15) VIBRATION: NO RESISTANCE CHANGE.
  - (16) POINTS OF MEASUREMENT: MEASURE ABSOLUTE RESISTANCE BETWEEN POINTS ON LEADS  $1.687 \pm 0.020$  INCHES APART. LEADS MUST BE STRAIGHT.
- C. ADDITIONS:
- (1) SERIES INDUCTANCE: 100 MICROHENRIES MAX WHEN MEASURED AT 1000 CPS AND 1.000 VRMS.
  - (2) POWER RATING: 1/3 WATT IN FREE AIR; 1 WATT WITH AN INFINITE HEAT SINK OR IN OIL DERATED TO 0 WATTS AT  $+50^\circ\text{C}$ .
  - (3) LEAD MATERIAL: TINNED COPPER.
  - (4) MARKING: EACH RESISTOR AND CONTAINER SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, TYPE NUMBER, ABSOLUTE RESISTANCE VALUE AND TOLERANCE, WATTAGE, AND GROUP CODE NUMBER. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER IF ANY.
  - (5) QUALITY ASSURANCE: VENDORS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015400, CLASS 2.

#### 2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

3. A. WAIVE AS REQUIRED ALL INFORMATION PRESENTED ON THIS DRAWING EXCEPT LEAD MATERIAL SPECIFICATION AND PHYSICAL DIMENSIONS.
- B. UPON SPECIFIC INSTRUCTION BY TECHNICAL DIRECTIVE (TD) PROCURE THIS PART AS CHANGE SYMBOL ( $\rightarrow$ ) BY ORDERING TO VENDOR CATALOGUE NUMBER & SPECIFICATIONS. REFERENCE ND1002034.
- C. DISREGARD THIS NOTE IN ITS ENTIRETY IF REFERENCE IS MADE TO THIS DRAWING BY OTHER THAN REVISION SYMBOL ( $\rightarrow$ ).

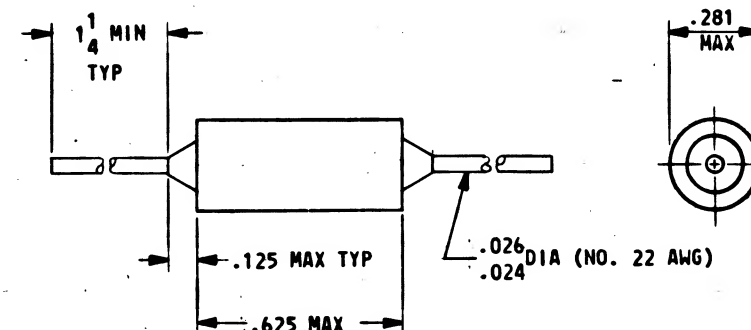
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DWG.

|             |         |   |          |        |
|-------------|---------|---|----------|--------|
|             |         | UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES |          |        |
|             |         | TOLERANCES ON                                       |          |        |
|             |         | FRACTIONS   | DECIMALS | ANGLES |
|             |         | $\pm$   | $\pm$    | $\pm$  |
|             |         | DO NOT SCALE THIS DRAWING                           |          |        |
|             |         | MATERIAL  |          |        |
|             |         | SEE NOTES   |          |        |
|             |         | HEAT TREATMENT                                      |          |        |
|             |         | NONE  |          |        |
|             |         | FINAL FINISH  |          |        |
|             |         | NONE  |          |        |
| NEXT ASSY   | USED ON |   |          |        |
| APPLICATION |         |   |          |        |

| DASH NO. | NOMINAL ABSOLUTE RESISTANCE ABOHMS | TOLERANCE    |
|----------|------------------------------------|--------------|
| -1       | 100                                | $\pm 0.02\%$ |
| -2       | 120                                |              |
| -3       | 140                                |              |
| -4       | 160                                |              |
| -5       | 180                                |              |
| -6       | 200                                |              |
| -7       | 220                                |              |
| -8       | 240                                |              |
| -9       | 260                                |              |
| -10      | 280                                |              |
| -11      | 300                                |              |
| -12      | 320                                |              |
| -13      | 340                                |              |
| -14      | 360                                |              |
| -15      | 380                                |              |
| -16      | 400                                |              |
| -17      | 420                                |              |
| -18      | 440                                |              |
| -19      | 460                                |              |
| -20      | 480                                |              |
| -21      | 500                                | $\pm 0.02\%$ |
| -22      | 6000                               | $\pm 0.1\%$  |

## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63



|  |                         |   |          |
|--|-------------------------|---|----------|
| QTY REQD                                   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                                     | FIND NO. |
| LIST OF MATERIALS                          |                         |   |          |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                      |          |
| DRAWN <i>D. B. Brown</i> DATE 31 DEC 62    |                         | RESISTOR, FIXED, WW, PRECISION<br>SPECIFICATION CONTROL DRAWING |          |
| CHECKED <i>J. M. Brown</i> 23 Jan 63       |                         |   |          |
| APPROVAL <i>J. B. Brown</i>                |                         | NASA APPROVAL <i>J. B. Brown</i> 2/20/63                        |          |
| MIT APPROVAL <i>J. B. Brown</i> 2/20/63    |                         | CODE IDENT NO.  | SIZE     |
|  |                         |   | C        |
|  |                         | SCALE NONE  | WT       |
|  |                         | NASA DRAWING NO. 1010254  |          |
|  |                         | SHEET 1 OF 1  |          |

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY FOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

#### NOTES:

##### 1. REQUIREMENTS:

- A. THESE RESISTORS SHALL MEET THE GENERAL REQUIREMENTS OF MIL-R-93 WITH THE EXCEPTIONS AND ADDITIONS BELOW.
- B. EXCEPTIONS:
- (1) RATINGS: ALL REQUIREMENTS AT  $25 \pm 2^\circ\text{C}$  WITH INFINITE HEATSINK OR OIL UNLESS SPECIFIED.
  - (2) QUALIFICATION: UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND1002057.
  - (3) DC RESISTANCE: AS SPECIFIED EXCEPT TEST VOLTAGE TO BE  $6.000 \pm 0.001$  VDC FOR DASH 22. FOR DASH 1 THRU 21 THE TEST CURRENT SHALL BE .001 AMP DC.
  - (4) RESISTANCE TOLERANCE: SEE TABLE.
  - (5) TEMPERATURE CYCLING: BETWEEN  $0^\circ\text{C}$  AND  $+50^\circ\text{C}$  WITH NO RESISTANCE CHANGE.
  - (6) SHORT TERM OVERLOAD: NO RESISTANCE CHANGE.
  - (7) DIELECTRIC WITHSTANDING VOLTAGE: NO RESISTANCE CHANGE.
  - (8) SALT WATER IMMERSION: NOT APPLICABLE.
  - (9) LIFE (STABILITY): 100 PPM/YEAR AT 2 HOURS PER DAY OPERATION AT LEAST 10 HOURS BETWEEN OPERATIONS, SAME CONDITIONS AS DC RESISTANCE.
  - (10) RESISTANCE TEMPERATURE COEFFICIENT: 10 PPM/ $^\circ\text{C}$  BETWEEN  $25^\circ\text{C}$  AND  $35^\circ\text{C}$ . SAME CONDITIONS AS DC RESISTANCE.
  - (11) LOW TEMPERATURE STORAGE: NOT APPLICABLE.
  - (12) LOW TEMPERATURE OPERATION: NOT APPLICABLE.
  - (13) HIGH TEMPERATURE EXPOSURE: NOT APPLICABLE.
  - (14) SHOCK: NO RESISTANCE CHANGE.
  - (15) VIBRATION: NO RESISTANCE CHANGE.
  - (16) POINTS OF MEASUREMENT: MEASURE ABSOLUTE RESISTANCE BETWEEN POINTS ON LEADS  $1.687 \pm .020$  INCHES APART. LEADS MUST BE STRAIGHT.
- C. ADDITIONS:
- (1) SERIES INDUCTANCE: 100 MICROHENRIES MAX WHEN MEASURED AT 1000 CPS AND 1.000 VRMS.
  - (2) POWER RATING: 1/3 WATT IN FREE AIR; 1 WATT WITH AN INFINITE HEAT SINK OR IN OIL DERATED TO 0 WATTS AT  $+50^\circ\text{C}$ .
  - (3) LEAD MATERIAL: TINNED COPPER.
  - (4) MARKING: EACH RESISTOR AND CONTAINER SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, TYPE NUMBER, ABSOLUTE RESISTANCE VALUE AND TOLERANCE, WATTAGE, AND GROUP CODE NUMBER, EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER IF ANY.
  - (5) QUALITY ASSURANCE: VENDORS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015400, CLASS 2.

##### 2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

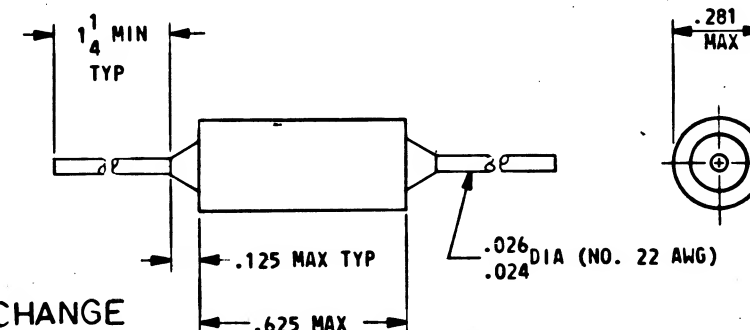
B 1010254

| DASH NO. | NOMINAL ABSOLUTE RESISTANCE ABOHMS | TOLERANCE    |
|----------|------------------------------------|--------------|
| -1       | 100                                | $\pm 0.02\%$ |
| -2       | 120                                |              |
| -3       | 140                                |              |
| -4       | 160                                |              |
| -5       | 180                                |              |
| -6       | 200                                |              |
| -7       | 220                                |              |
| -8       | 240                                |              |
| -9       | 260                                |              |
| -10      | 280                                |              |
| -11      | 300                                |              |
| -12      | 320                                |              |
| -13      | 340                                |              |
| -14      | 360                                |              |
| -15      | 380                                |              |
| -16      | 400                                |              |
| -17      | 420                                |              |
| -18      | 440                                |              |
| -19      | 460                                |              |
| -20      | 480                                |              |
| -21      | 500                                | $\pm 0.02\%$ |
| -22      | 6000                               | $\pm 0.1\%$  |

| REVISIONS |   |      |          |
|-----------|---|------|----------|
| SYM       | DESCRIPTION                               | DATE | APPROVAL |
| B         | REPLACES REV A WITH CHANGE PER TORR 00513 |      | WK       |

## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63



ⓑ REPLACES REV A WITH CHANGE

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DWG.

MASTER

MASTER

|   |  |                         |  |                             |   |          |  |  |
|---|--|-------------------------|--|-----------------------------|---|----------|--|--|
| QTY REQD  |  | PART OR IDENTIFYING NO. |  | NOMENCLATURE OR DESCRIPTION |   | FIND NO. |  |  |
| LIST OF MATERIALS   |  |                         |  |                             |   |          |  |  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.   |  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |                             |   |          |  |  |
| DRAWN <i>D. B. Berman</i> DATE 31 DEC 62<br>CHECKED <i>J. M. Berman</i> 23 Jan 63<br>APPROVAL <i>J. B. Berman</i>   |  |                         | RESISTOR, FIXED, WW, PRECISION<br>SPECIFICATION CONTROL DRAWING                      |                             |   |          |  |  |
| UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>FRACTIONS DECIMALS ANGLES<br>$\pm$ $\pm$ $\pm$<br>DO NOT SCALE THIS DRAWING<br>MATERIAL<br>SEE NOTES<br>HEAT TREATMENT<br>NONE<br>FINAL FINISH<br>NONE |  |                         | NASA APPROVAL <i>Jack Berman</i> 2/20/63<br>MIT APPROVAL <i>W. J. Berman</i> 2/20/63 |                             | CODE IDENT NO. SIZE<br>C<br>NASA DRAWING NO.<br>1010254 |          |  |  |
| NEXT ASSY   |  | USED ON                 |  | SCALE NONE WT               |   |          |  |  |
| APPLICATION   |  |                         |  | SHEET 1 OF 1                |   |          |  |  |

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- B. EXCEPTIONS:
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  - (3) DC RESISTANCE: AS SPECIFIED EXCEPT TEST VOLTAGE TO BE  $6.000 \pm 0.001$  VDC FOR DASH 22. FOR DASH 1 THRU 21 THE TEST CURRENT SHALL BE .001 AMP DC.
  - (4) RESISTANCE TOLERANCE: SEE TABLE.
  - (5) TEMPERATURE CYCLING: BETWEEN  $0^\circ\text{C}$  AND  $+50^\circ\text{C}$  WITH NO RESISTANCE CHANGE.
  - (6) SHORT TERM OVERLOAD: NO RESISTANCE CHANGE.
  - (7) DIELECTRIC WITHSTANDING VOLTAGE: NO RESISTANCE CHANGE.
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  - (3) LEAD MATERIAL: TINNED COPPER.
  - (4) MARKING: EACH RESISTOR AND CONTAINER SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, TYPE NUMBER, ABSOLUTE RESISTANCE VALUE AND TOLERANCE, WATTAGE, AND GROUP CODE NUMBER. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER IF ANY.
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##### 2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DWG.

MASTER

MASTER

|   |                 |
|---|-----------------|
| UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON |                 |
| FRACTIONS   | DECIMALS ANGLES |
| $\pm$   | $\pm$           |
| DO NOT SCALE THIS DRAWING   |                 |
| MATERIAL  |                 |
| SEE NOTES   |                 |
| HEAT TREATMENT  |                 |
| NONE  |                 |
| FINAL FINISH  |                 |
| NONE  |                 |
| NEXT ASSY   | USED ON         |
| APPLICATION   |                 |

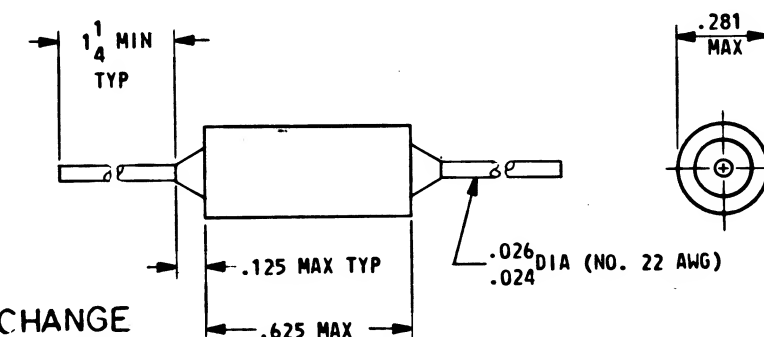
| DASH NO. | NOMINAL ABSOLUTE RESISTANCE ABOHMS | TOLERANCE    |
|----------|------------------------------------|--------------|
| -1       | 100                                | $\pm 0.02\%$ |
| -2       | 120                                |              |
| -3       | 140                                |              |
| -4       | 160                                |              |
| -5       | 180                                |              |
| -6       | 200                                |              |
| -7       | 220                                |              |
| -8       | 240                                |              |
| -9       | 260                                |              |
| -10      | 280                                |              |
| -11      | 300                                |              |
| -12      | 320                                |              |
| -13      | 340                                |              |
| -14      | 360                                |              |
| -15      | 380                                |              |
| -16      | 400                                |              |
| -17      | 0                                  |              |
| -18      | 440                                |              |
| -19      | 460                                |              |
| -20      | 480                                |              |
| -21      | 500                                | $\pm 0.02\%$ |
| -22      | 6000                               | $\pm 0.1\%$  |

1010254

| REVISIONS |  |        |          |
|-----------|--|--------|----------|
| SYM       | DESCRIPTION                                  | DATE   | APPROVAL |
| B         | REPLACES REV A WITH CHANGE PER TDR 00513     |        | WKL      |
| C         | REPLACED BY REV D WITH CHANGES PER TDR 02229 | 7/4/63 | WKL      |

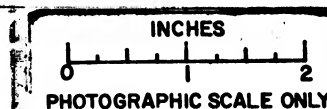
FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63



(B) REPLACES REV A WITH CHANGE  
(C) REPLACED BY REV (D) WITH CHANGES

|  |                         |   |                             |
|--|-------------------------|---|-----------------------------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                                     | FIND NO.                    |
| LIST OF MATERIALS  |                         |   |                             |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                      |                             |
| DRAWN <i>D. Bergman</i> DATE 31 DEC 62<br>CHECKED <i>J. M. Slesinger</i> 23 Jan 63<br>APPROVAL <i>W. J. Benton</i><br>APPROVAL |                         | RESISTOR, FIXED, WW, PRECISION<br>SPECIFICATION CONTROL DRAWING |                             |
| NASA APPROVAL <i>Jack Bergman</i> 2/20/63<br>MIT APPROVAL <i>W. J. Benton</i> 2/20/63  |                         | CODE IDENT NO. SIZE<br>C  | NASA DRAWING NO.<br>1010254 |
| SCALE NONE   |                         | WT  | SHEET 1 OF 1                |





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#### REQUIREMENTS:

##### GENERAL:

UNITS SHALL BE CAPABLE OF MEETING ALL THE GENERAL REQUIREMENTS OF MIL-R-93 EXCEPT AS SPECIFIED HEREIN. PACKAGING: UNITS SHALL BE PACKAGED PER MIL-R-93 LEVEL A. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.

##### INSPECTION AND ACCEPTANCE:

###### ELECTRICAL REQUIREMENTS:

RATINGS: ALL REQUIREMENTS AT  $25 \pm 2^\circ\text{C}$  WITH INFINITE HEATSINK OR OIL BATH UNLESS SPECIFIED. DC RESISTANCE: AS SPECIFIED EXCEPT TEST VOLTAGE TO BE  $6,000 \pm 0,001$  VDC FOR DASH 22. FOR DASH 1 THRU 21 THE TEST CURRENT SHALL BE .001 AMP DC.

RESISTANCE TOLERANCE: PER TABLE.

RESISTANCE TEMPERATURE COEFFICIENT: 10 PPM/ $^\circ\text{C}$  BETWEEN  $25^\circ\text{C}$  AND  $35^\circ\text{C}$ . SAME CONDITIONS AS DC RESISTANCE.

POINTS OF MEASUREMENT: MEASURE ABSOLUTE RESISTANCE BETWEEN POINTS ON LEADS  $1.687 \pm .020$  INCHES APART. LEADS MUST BE STRAIGHT.

###### MECHANICAL REQUIREMENTS:

LEAD MATERIAL: TINNED COPPER.

MARKING: THE MANUFACTURER'S NAME OR SYMBOL, THE NASA DRAWING NUMBER, DASH NUMBER (IF ANY), REVISION LETTER, DATE CODE, SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER MIL-STD-130. ALSO INDICATE ABSOLUTE RESISTANCE VALUE AND TOLERANCE. THE MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH CONTAINER SHALL ALSO CONTAIN THE NASA PART NUMBER, DASH NUMBER, AND REVISION LETTER.

##### DESIGN REQUIREMENTS:

PER THE REQUIREMENTS OF MIL-R-93 EXCEPT AS MODIFIED HEREIN. TEMPERATURE CYCLING: BETWEEN  $0^\circ\text{C}$  AND  $+50^\circ\text{C}$  WITH NO RESISTANCE CHANGE.

SHORT TERM OVERLOAD: 20 PPM MAX.

DIELECTRIC WITHSTANDING VOLTAGE: NO RESISTANCE CHANGE AT 500 VOLTS RMS.

SALT WATER IMMERSION: NOT APPLICABLE.

LIFE (STABILITY): 100 PPM/YEAR AT 2 HOURS PER DAY OPERATION AT LEAST 10 HOURS BETWEEN OPERATIONS. SAME CONDITIONS AS DC RESISTANCE.

SERIES INDUCTANCE: 100 MICROHENRIES MAX WHEN MEASURED AT 1000 CPS AND 1.000 VRMS.

POWER RATING:  $1/8$  WATT IN FREE AIR; DERATED TO 0 WATTS AT  $+50^\circ\text{C}$ .

SHOCK: NO RESISTANCE CHANGE.

VIBRATION: NO RESISTANCE CHANGE.

LOW TEMPERATURE STORAGE: NOT APPLICABLE.

LOW TEMPERATURE OPERATION: NOT APPLICABLE.

HIGH TEMPERATURE EXPOSURE: NOT APPLICABLE.

##### SPECIAL CONDITIONING BY SUPPLIER:

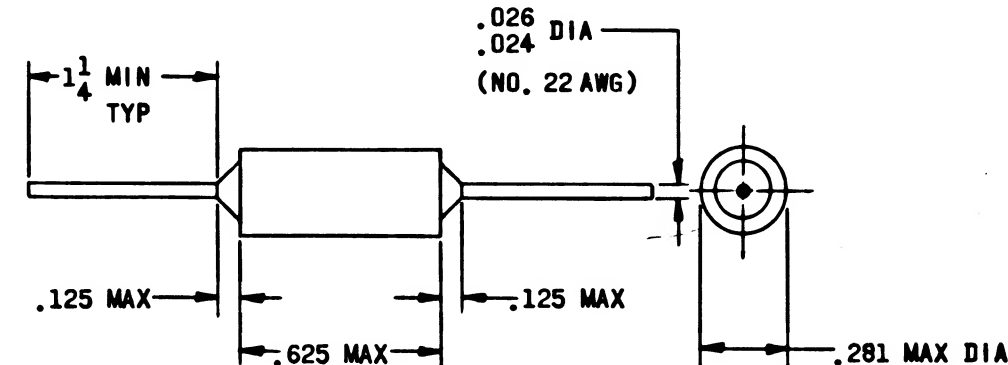
BURN-IN: UNITS SHALL HAVE  $1/8$  WATT APPLIED FOR 100 HOURS @  $25^\circ\text{C}$ . THE RESISTANCE CHANGE SHALL NOT EXCEED .01%.

UNITS SHALL BE IN TOLERANCE BEFORE AND AFTER BURN-IN.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

| DASH NO. | NOMINAL ABSOLUTE RESISTANCE OHMS | TOLERANCE    |
|----------|----------------------------------|--------------|
| -1       | 100                              | $\pm 0.02\%$ |
| -2       | 120                              |              |
| -3       | 140                              |              |
| -4       | 160                              |              |
| -5       | 180                              |              |
| -6       | 200                              |              |
| -7       | 220                              |              |
| -8       | 240                              |              |
| -9       | 260                              |              |
| -10      | 280                              |              |
| -11      | 300                              |              |
| -12      | 320                              |              |
| -13      | 340                              |              |
| -14      | 360                              |              |
| -15      | 380                              |              |
| -16      | 400                              |              |
| -17      | 420                              |              |
| -18      | 440                              |              |
| -19      | 460                              |              |
| -20      | 480                              |              |
| -21      | 500                              | $\pm 0.02\%$ |
| -22      | 6000                             | $\pm 0.1\%$  |

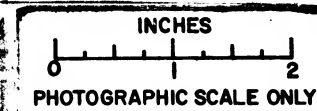
THE COMPLETE PART NUMBER IS THIS DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.



REPLACES REV(C) WITH CHANGE

|  |          |             |
|--|----------|-------------|
| UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES |          |             |
| TOLERANCES ON  |          |             |
| FRACTIONS  | DECIMALS | ANGLES      |
| $\pm$  | $\pm$    | $\pm$       |
| DO NOT SCALE THIS DRAWING                              |          |             |
| MATERIAL   |          |             |
| SEE NOTES  |          |             |
| HEAT TREATMENT   |          |             |
| NONE   |          |             |
| FINAL FINISH   |          |             |
| NONE   |          |             |
| NEXT ASSY  | USED ON  | APPLICATION |

|   |                         |  |          |
|---|-------------------------|--|----------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                | FIND NO. |
| LIST OF MATERIALS   |                         |  |          |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>CONTRACT NAS9-497 |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |          |
| DRAWN Heigert DATE 18 JUN 63                                    |                         | RESISTOR, FIXED, WW, PRECISION             |          |
| CHECKED R. Koparsky 20 JUN 63                                   |                         | SPECIFICATION CONTROL DRAWING              |          |
| APPROVAL O. B. Test 7/22/63                                     |                         | CODE IDENT NO. SIZE                        |          |
| NASA APPROVAL [Signature] 7/24/63                               |                         | C 1010254                                  |          |
| MIT APPROVAL [Signature] 7/24/63                                |                         | SCALE NONE WT                              |          |
|   |                         | SHEET 1 OF 1                               |          |





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#### REQUIREMENTS:

##### 1. GENERAL:

- UNITS SHALL BE CAPABLE OF MEETING ALL THE GENERAL REQUIREMENTS OF MIL-R-93 EXCEPT AS SPECIFIED HEREIN.
- PACKAGING: UNITS SHALL BE PACKAGED PER MIL-R-93 LEVEL A.
- INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.

##### 2. INSPECTION AND ACCEPTANCE:

###### A. ELECTRICAL REQUIREMENTS:

- RATINGS: ALL REQUIREMENTS AT  $25 \pm 2^\circ\text{C}$  WITH INFINITE HEATSINK OR OIL BATH UNLESS SPECIFIED.
- DC RESISTANCE: AS SPECIFIED EXCEPT TEST VOLTAGE TO BE  $6,000 \pm 0,001$  VDC FOR DASH 22. FOR DASH 1 THRU 21 THE TEST CURRENT SHALL BE .001 AMP DC.
- RESISTANCE TOLERANCE: PER TABLE.
- RESISTANCE TEMPERATURE COEFFICIENT: 10 PPM/ $^\circ\text{C}$  BETWEEN  $25^\circ\text{C}$  AND  $35^\circ\text{C}$ . SAME CONDITIONS AS DC RESISTANCE.
- POINTS OF MEASUREMENT: MEASURE ABSOLUTE RESISTANCE BETWEEN POINTS ON LEADS  $1.687 \pm .020$  INCHES APART. LEADS MUST BE STRAIGHT.

###### B. MECHANICAL REQUIREMENTS:

- LEAD MATERIAL: TINNED COPPER.
- MARKING: THE MANUFACTURER'S NAME OR SYMBOL, THE NASA DRAWING NUMBER, DASH NUMBER (IF ANY), REVISION LETTER, DATE CODE, SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019. ALSO INDICATE ABSOLUTE RESISTANCE VALUE AND TOLERANCE. THE MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH CONTAINER SHALL ALSO CONTAIN THE NASA PART NUMBER, DASH NUMBER, AND REVISION LETTER.

##### 3. DESIGN REQUIREMENTS:

- PER THE REQUIREMENTS OF MIL-R-93 EXCEPT AS MODIFIED HEREIN.
- TEMPERATURE CYCLING: BETWEEN  $0^\circ\text{C}$  AND  $+50^\circ\text{C}$  WITH NO RESISTANCE CHANGE.
- SHORT TERM OVERLOAD: 20 PPM MAX.
- DIELECTRIC WITHSTANDING VOLTAGE: NO RESISTANCE CHANGE AT 500 VOLTS RMS.
- SALT WATER IMMERSION: NOT APPLICABLE.
- LIFE (STABILITY): 100 PPM/YEAR AT 2 HOURS PER DAY OPERATION AT LEAST 10 HOURS BETWEEN OPERATIONS. SAME CONDITIONS AS DC RESISTANCE.
- SERIES INDUCTANCE: 100 MICROHENRIES MAX WHEN MEASURED AT 1000 CPS AND 1,000 VRMS.
- POWER RATING:  $1/8$  WATT IN FREE AIR; DERATED TO 0 WATTS AT  $+50^\circ\text{C}$ .
- SHOCK: .001% MAX RESISTANCE CHANGE
- VIBRATION: .001% MAX RESISTANCE CHANGE
- LOW TEMPERATURE STORAGE: NOT APPLICABLE.
- LOW TEMPERATURE OPERATION: NOT APPLICABLE.
- HIGH TEMPERATURE EXPOSURE: NOT APPLICABLE.

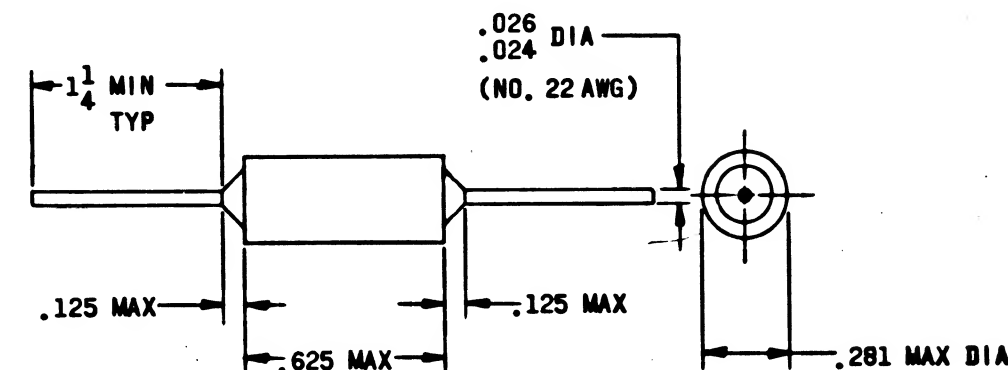
##### A. SPECIAL CONDITIONING BY SUPPLIER:

- BURN-IN: UNITS SHALL HAVE  $1/8$  WATT APPLIED FOR 100 HOURS @  $25^\circ\text{C}$ . THE RESISTANCE CHANGE SHALL NOT EXCEED .01%.
- UNITS SHALL BE IN TOLERANCE BEFORE AND AFTER BURN-IN.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

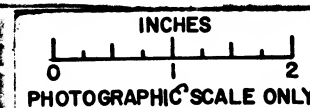
| DASH NO. | NOMINAL RESISTANCE | ABSOLUTE OHMS | TOLERANCE    |
|----------|--------------------|---------------|--------------|
| -1       | 100                |               | $\pm 0.02\%$ |
| -2       | 120                |               |              |
| -3       | 140                |               |              |
| -4       | 160                |               |              |
| -5       | 180                |               |              |
| -6       | 200                |               |              |
| -7       | 220                |               |              |
| -8       | 240                |               |              |
| -9       | 260                |               |              |
| -10      | 280                |               |              |
| -11      | 300                |               |              |
| -12      | 320                |               |              |
| -13      | 340                |               |              |
| -14      | 360                |               |              |
| -15      | 380                |               |              |
| -16      | 400                |               |              |
| -17      | 420                |               |              |
| -18      | 440                |               |              |
| -19      | 460                |               |              |
| -20      | 480                |               |              |
| -21      | 500                |               | $\pm 0.02\%$ |
| -22      | 6000               |               | $\pm 0.1\%$  |

THE COMPLETE PART NUMBER IS THIS DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.



REPLACES REV(C) WITH CHANGE

|   |                         |   |         |
|---|-------------------------|---|---------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                       | FIG NO. |
| LIST OF MATERIALS   |                         |   |         |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>CONTRACT NAS9-497 |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS        |         |
| DRAWN <i>Heigert</i> DATE <i>6/3</i>                            |                         | RESISTOR, FIXED, WW, PRECISION                    |         |
| CHECKED <i>R. P. ...</i> DATE <i>20 JUN 63</i>                  |                         | SPECIFICATION CONTROL DRAWING                     |         |
| APPROVAL <i>R. P. ...</i> DATE <i>7/2/63</i>                    |                         | NASA APPROVAL <i>R. P. ...</i> DATE <i>7/2/63</i> |         |
| MIT APPROVAL <i>W. R. ...</i> DATE <i>2/2/63</i>                |                         | NASA DRAWING NO. 1010254                          |         |
| HEAT TREATMENT NONE   |                         | CODE IDENT NO. C                                  |         |
| FINAL FINISH NONE   |                         | SCALE NONE WT                                     |         |
| NEXT ASSY   |                         | USED ON   |         |
| APPLICATION   |                         | SHEET 1 OF 1                                      |         |



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#### NOTES:

##### 1. REQUIREMENTS:

- A. THESE RESISTORS SHALL MEET THE GENERAL REQUIREMENTS OF MIL-R-93 WITH THE EXCEPTIONS AND ADDITIONS BELOW.
- B. EXCEPTIONS:
- (1) RATINGS: ALL REQUIREMENTS AT  $25 \pm 2^\circ\text{C}$  WITH INFINITE HEATSINK OR OIL UNLESS SPECIFIED.
  - (2) QUALIFICATION: UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND1002057.
  - (3) DC RESISTANCE: AS SPECIFIED EXCEPT TEST VOLTAGE TO BE  $6.000 \pm 0.001$  VDC FOR DASH 22. FOR DASH 1 THRU 21 THE TEST CURRENT SHALL BE .001 AMP DC.
  - (4) RESISTANCE TOLERANCE: SEE TABLE.
  - (5) TEMPERATURE CYCLING: BETWEEN  $0^\circ\text{C}$  AND  $+50^\circ\text{C}$  WITH NO RESISTANCE CHANGE.
  - (6) SHORT TERM OVERLOAD: NO RESISTANCE CHANGE.
  - (7) DIELECTRIC WITHSTANDING VOLTAGE: NO RESISTANCE CHANGE.
  - (8) SALT WATER IMMERSION: NOT APPLICABLE.
  - (9) LIFE (STABILITY): 100 PPM/YEAR AT 2 HOURS PER DAY OPERATION AT LEAST 10 HOURS BETWEEN OPERATIONS, SAME CONDITIONS AS DC RESISTANCE.
  - (10) RESISTANCE TEMPERATURE COEFFICIENT: 10 PPM/ $^\circ\text{C}$  BETWEEN  $25^\circ\text{C}$  AND  $35^\circ\text{C}$ . SAME CONDITIONS AS DC RESISTANCE.
  - (11) LOW TEMPERATURE STORAGE: NOT APPLICABLE.
  - (12) LOW TEMPERATURE OPERATION: NOT APPLICABLE.
  - (13) HIGH TEMPERATURE EXPOSURE: NOT APPLICABLE.
  - (14) SHOCK: NO RESISTANCE CHANGE.
  - (15) VIBRATION: NO RESISTANCE CHANGE.
  - (16) POINTS OF MEASUREMENT: MEASURE ABSOLUTE RESISTANCE BETWEEN POINTS ON LEADS  $1.687 \pm 0.020$  INCHES APART. LEADS MUST BE STRAIGHT.
- C. ADDITIONS:
- (1) SERIES INDUCTANCE: 100 MICROHENRIES MAX WHEN MEASURED AT 1000 CPS AND 1.000 VRMS.
  - (2) POWER RATING:  $1/3$  WATT IN FREE AIR; 1 WATT WITH AN INFINITE HEAT SINK OR IN OIL DERATED TO 0 WATTS AT  $+50^\circ\text{C}$ .
  - (3) LEAD MATERIAL: TINNED COPPER.
  - (4) MARKING: EACH RESISTOR AND CONTAINER SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, TYPE NUMBER, ABSOLUTE RESISTANCE VALUE AND TOLERANCE, WATTAGE, AND GROUP CODE NUMBER. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER IF ANY.
  - (5) QUALITY ASSURANCE: VENDORS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015400, CLASS 2.

##### 2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

3. A. WAIVE AS REQUIRED ALL INFORMATION PRESENTED ON THIS DRAWING EXCEPT LEAD MATERIAL SPECIFICATION AND PHYSICAL DIMENSIONS.
- B. UPON SPECIFIC INSTRUCTION BY TECHNICAL DIRECTIVE (TD) PROCURE THIS PART AS CHANGE SYMBOL ( $\rightarrow$ ) BY ORDERING TO VENDOR CATALOGUE NUMBER & SPECIFICATIONS. REFERENCE ND1002034.
- C. DISREGARD THIS NOTE IN ITS ENTIRETY IF REFERENCE IS MADE TO THIS DRAWING BY OTHER THAN REVISION SYMBOL ( $\rightarrow$ ).

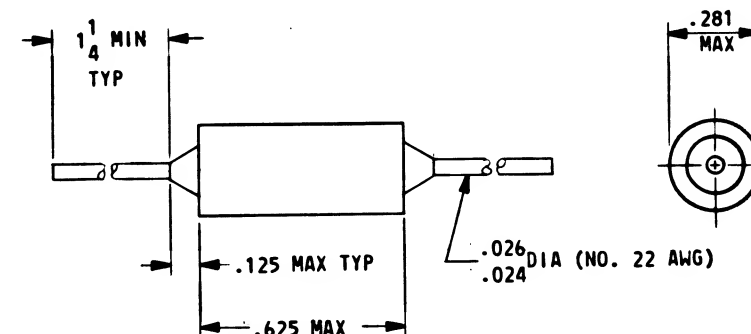
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DWG.

|             |         |   |
|-------------|---------|---|
|             |         | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>FRACTIONS DECIMALS ANGLES<br>$\pm$ $\pm$ $\pm$ |
|             |         | DO NOT SCALE THIS DRAWING   |
|             |         | MATERIAL  |
|             |         | SEE NOTES   |
|             |         | HEAT TREATMENT<br>NONE  |
|             |         | FINAL FINISH<br>NONE  |
| NEXT ASSY   | USED ON |   |
| APPLICATION |         |   |

| DASH NO. | NOMINAL ABSOLUTE RESISTANCE ABOHMS | TOLERANCE    |
|----------|------------------------------------|--------------|
| -1       | 100                                | $\pm 0.02\%$ |
| -2       | 120                                |              |
| -3       | 140                                |              |
| -4       | 160                                |              |
| -5       | 180                                |              |
| -6       | 200                                |              |
| -7       | 220                                |              |
| -8       | 240                                |              |
| -9       | 260                                |              |
| -10      | 280                                |              |
| -11      | 300                                |              |
| -12      | 320                                |              |
| -13      | 340                                |              |
| -14      | 360                                |              |
| -15      | 380                                |              |
| -16      | 400                                |              |
| -17      | 420                                |              |
| -18      | 440                                |              |
| -19      | 460                                |              |
| -20      | 480                                |              |
| -21      | 500                                | $\pm 0.02\%$ |
| -22      | 6000                               | $\pm 0.1\%$  |

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63



|          |   |  |                                 |
|----------|---|--|---------------------------------|
| QTY REQD | PART OR IDENTIFYING NO.                       | NOMENCLATURE OR DESCRIPTION                | FIND NO.                        |
|          |   | LIST OF MATERIALS                          |                                 |
|          | MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.   | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |                                 |
|          | DWG. NO. <u>1010254</u> DATE <u>31 DEC 62</u> | RESISTOR, FIXED, WW, PRECISION             |                                 |
|          | CHECKED <u>J. M. Blum</u> 23 Jan 63           | SPECIFICATION CONTROL DRAWING              |                                 |
|          | APPROVAL <u>J. M. Blum</u>                    |  |                                 |
|          | NASA APPROVAL <u>J. M. Blum</u> 2/20/63       | CODE IDENT NO. <u>C</u> SIZE <u>C</u>      | NASA DRAWING NO. <u>1010254</u> |
|          | MIT APPROVAL <u>W. J. Benton</u>              | SCALE <u>NONE</u> WT <u></u>               | SHEET <u>1</u> OF <u>1</u>      |

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#### REQUIREMENTS:

##### GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER DOCUMENT 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

ELECTRICAL CHARACTERISTICS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

MARKING: MARK UNITS PER MIL-STD-130 WITH MANUFACTURERS NAME OR SYMBOL, TYPE DESIGNATION, DATE CODE, LOT CODE, SERIAL NUMBER AND A BAND INDICATING CATHODE.

##### GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$

ELECTRICAL RATING: PER TABLE I

TOLERANCE:  $\pm 5\%$

ELECTRICAL SPECIFICATION: PER TABLE II

POWER DISSIPATION: 250 MILLIWATTS MAX, DERATED PER CURVE.

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002054.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER DOCUMENT 1015404, CLASS 1.

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491 LEVEL A IN BOTH INSTANCES.

(1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

##### GROUP III (SPECIAL CONDITIONING BY SUPPLIER):

BURN IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

1. AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$
2. POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  CASE TEMPERATURE RATING.

DIODES WHICH FAIL TO MEET ALL INITIAL MEASUREMENTS AND THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN IN SHALL NOT BE ACCEPTABLE.

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN IN:

1. ZENER VOLTAGE ( $V_Z$ )
2. DYNAMIC IMPEDANCE ( $Z_{ZT}$ )

PARAMETRIC CHANGE LIMITS:

1. ZENER VOLTAGE:  $\pm 1\%$  OF INITIAL VALUE.
2. DYNAMIC IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

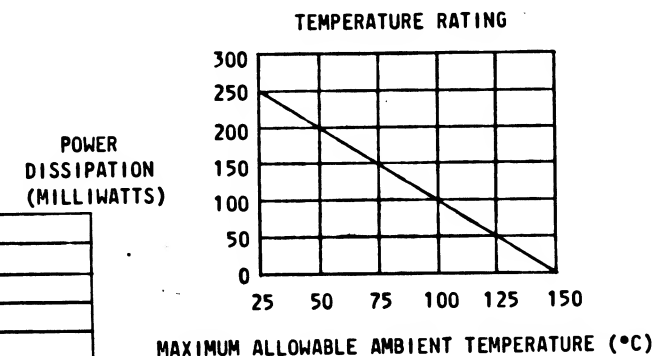
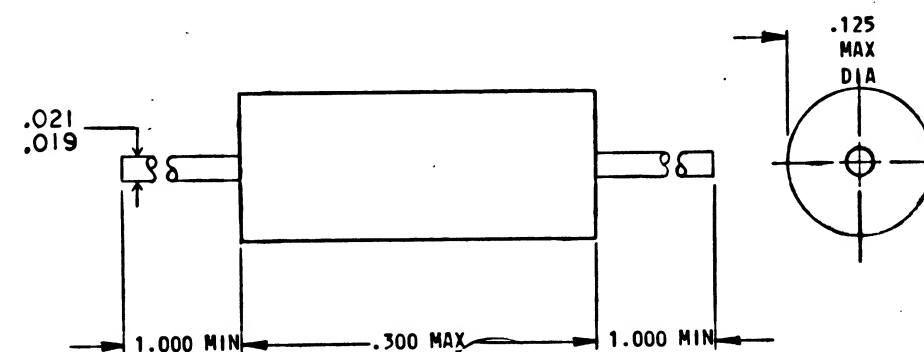
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING.

1010257

| REVISIONS |                        |         |          |
|-----------|------------------------|---------|----------|
| SYM       | DESCRIPTION            | DATE    | APPROVAL |
| -         |                        |         |          |
| A         | REVISED PER TDRR 01158 | 8/17/63 | WK       |

## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00497 DATE 3-6-63

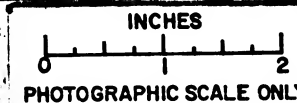


| REVISION STATUS OF SHEETS |         |
|---------------------------|---------|
| A                         | —       |
| SHEET 1                   | SHEET 2 |

MASTER

|   |          |        |
|---|----------|--------|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES |          |        |
| TOLERANCES ON                                       |          |        |
| FRACTIONS   | DECIMALS | ANGLES |
| $\pm$   | $\pm$    | $\pm$  |
| DO NOT SCALE THIS DRAWING                           |          |        |
| MATERIAL  |          |        |
| SEE NOTES   |          |        |
| HEAT TREATMENT                                      |          |        |
| NONE  |          |        |
| FINAL FINISH  |          |        |
| NONE  |          |        |
| NEXT ASSY   | USED ON  |        |
| APPLICATION   |          |        |

|   |                         |  |                  |
|---|-------------------------|--|------------------|
| QTY REQD                                    | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                | FIND NO.         |
| LIST OF MATERIALS                           |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS. |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |                  |
| DRAWN <i>D. Engman</i> DATE 28 DEC 62       |                         | SEMICONDUCTOR DEVICE, DIODE, (V R)         |                  |
| CHECKED <i>S. S. Feltz</i> 1-6-63           |                         | SPECIFICATION CONTROL DRAWING              |                  |
| APPROVAL <i>[Signature]</i> 3/6/63          |                         |  |                  |
| NASA APPROVAL <i>[Signature]</i>            |                         | CODE IDENT NO.                             | NASA DRAWING NO. |
| MIT APPROVAL <i>[Signature]</i> 6/14/63     |                         | C  | 1010257          |
|   |                         | SCALE NONE                                 | SHEET 1 OF 2     |





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#### REQUIREMENTS:

##### GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER DOCUMENT 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

ELECTRICAL CHARACTERISTICS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

MARKING: MARK UNITS PER MIL-STD-130 WITH MANUFACTURERS NAME OR SYMBOL, TYPE DESIGNATION, DATE CODE, LOT CODE, SERIAL NUMBER AND A BAND INDICATING CATHODE.

##### GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$

ELECTRICAL RATING: PER TABLE I

TOLERANCE:  $\pm 5\%$

ELECTRICAL SPECIFICATION: PER TABLE II

POWER DISSIPATION: 250 MILLIWATTS MAX, DERATED PER CURVE.

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002054.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER DOCUMENT 1015404, CLASS 1.

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491 LEVEL A IN BOTH INSTANCES.

(1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

##### GROUP III (SPECIAL CONDITIONING BY SUPPLIER):

BURN IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

1. AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$
2. POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  CASE TEMPERATURE RATING.

DIODES WHICH FAIL TO MEET ALL INITIAL MEASUREMENTS AND THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN IN SHALL NOT BE ACCEPTABLE.

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN IN:

1. ZENER VOLTAGE ( $V_Z$ )
2. DYNAMIC IMPEDANCE ( $Z_{ZT}$ )

PARAMETRIC CHANGE LIMITS:

1. ZENER VOLTAGE:  $\pm 1\%$  OF INITIAL VALUE.
2. DYNAMIC IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

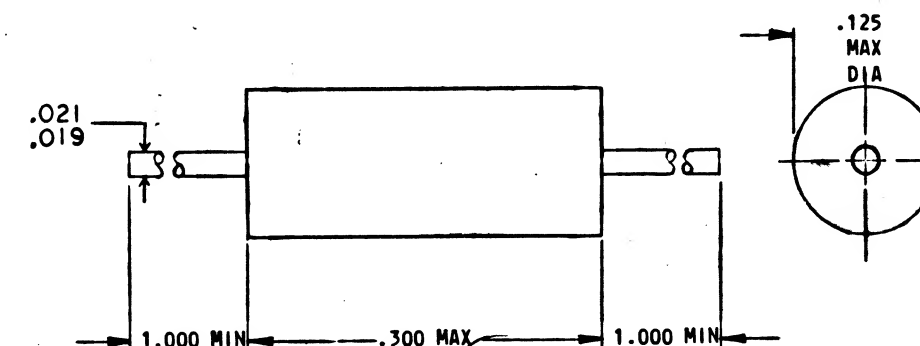
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING.

| REVISIONS |   |         |          |
|-----------|---|---------|----------|
| SYM       | DESCRIPTION                                   | DATE    | APPROVAL |
| B         | 1010257                                       |         |          |
| A         | REVISED PER TDRR 01158                        | 8/1/63  | WR       |
| B         | REPLACED BY REV C WITH CHANGES PER TDRR 01786 | 6-26-63 | WR       |

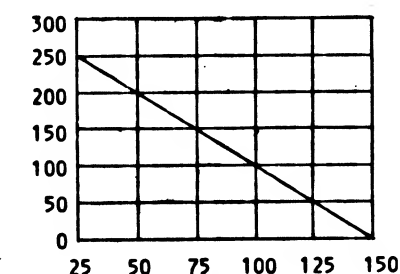
## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00497 DATE 3-6-63



Ⓑ REPLACED BY REV C WITH CHANGES

TEMPERATURE RATING



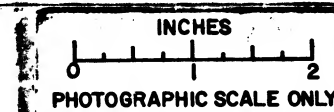
MAXIMUM ALLOWABLE AMBIENT TEMPERATURE ( $^{\circ}\text{C}$ )

| B                         | B       |
|---------------------------|---------|
| A                         |         |
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

NOTES

|   |                 |
|---|-----------------|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES |                 |
| TOLERANCES ON                                       |                 |
| FRACTIONS   | DECIMALS ANGLES |
| $\pm$   | $\pm$ $\pm$     |
| DO NOT SCALE THIS DRAWING                           |                 |
| MATERIAL  |                 |
| SEE NOTES   |                 |
| HEAT TREATMENT                                      | NONE            |
| FINAL FINISH  | NONE            |
| NEXT ASSY   | USED ON         |
| APPLICATION   |                 |

| QTY REQD                                    | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                | FIND NO.         |
|---|-------------------------|--|------------------|
| LIST OF MATERIALS                           |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS. |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |                  |
| DWS. NO. CONTRACT                           |                         | SEMICONDUCTOR DEVICE, DIODE, (V R)         |                  |
| DRAWN <i>D. Ruggan</i> DATE 28 DEC 62       |                         | SPECIFICATION CONTROL DRAWING              |                  |
| CHECKED <i>S. S. Phillips</i> 10 Feb 63     |                         |  |                  |
| APPROVAL <i>W. H. Hays</i> 3/6/63           |                         |  |                  |
| APPROVAL                                    |                         |  |                  |
| NASA APPROVAL <i>James</i>                  |                         | CODE IDENT NO.                             | NASA DRAWING NO. |
| MIT APPROVAL <i>W. H. Hays</i> 6/6/63       |                         | SIZE C                                     | 1010257          |
|   |                         | SCALE NONE                                 | WT               |
|   |                         | SHEET 1 OF 2                               |                  |



NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONFIRMING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

| REVISIONS |   |        |          |
|-----------|---|--------|----------|
| SYM       | DESCRIPTION                                   | DATE   | APPROVAL |
| -         |   |        |          |
| B         | REPLACED BY REV C WITH CHANGES PER TDRR 01786 | 6-6-63 | Wk.      |

TABLE I

| DASH NUMBER | MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) |                       |   |                                      |
|-------------|--|-----------------------|---|--------------------------------------|
|             | ZENER CURRENT (I <sub>ZM</sub> )   | POWER DISSIPATION (P) | ZENER CURRENT AT T <sub>A</sub> = 125°C | EIA TYPE DESIGNATION (FOR REFERENCE) |
|             | MA <sub>DC</sub>   | MW                    | MA <sub>DC</sub>                        |                                      |
| 1           | 10   | 250                   | 2                                       | 1N769-2                              |
| 2           | 10   | 250                   | 2                                       | 1N769-3                              |

TABLE II

| ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C |            |                         |                      |      |       |       |
|--|------------|-------------------------|----------------------|------|-------|-------|
| PARAMETER  | CONDITIONS | SYMBOL                  | SPECIFICATION LIMITS |      |       |       |
|  |            |                         | MIN                  | MAX  | UNITS |       |
| ZENER VOLTAGE  | -001       | $I_{ZT} = 5 \text{ MA}$ | $V_Z$                | 22.8 | 25.2  | VOLTS |
|  | -002       | $I_{ZT} = 5 \text{ MA}$ | $V_Z$                | 24.7 | 27.3  | VOLTS |
| ZENER IMPEDANCE  | -001       | $I_{ZT} = 5 \text{ MA}$ | $Z_{ZT}$             | -    | 150   | OHMS  |
|  | -002       | $I_{ZT} = 5 \text{ MA}$ | $Z_{ZT}$             | -    | 150   | OHMS  |

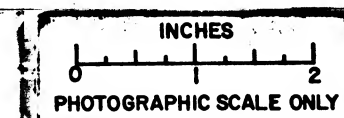
FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00497 DATE 3-6-63

ⓑ REPLACED BY REV C WITH CHANGES

MASTER

|   |  |                         |  |                             |                  |          |  |  |
|---|--|-------------------------|--|-----------------------------|------------------|----------|--|--|
| QTY REQD                                      |  | PART OR IDENTIFYING NO. |  | NOMENCLATURE OR DESCRIPTION |                  | FIND NO. |  |  |
| LIST OF MATERIALS                             |  |                         |  |                             |                  |          |  |  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.   |  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |                             |                  |          |  |  |
| DRAWN <i>D. Byrnes</i> DATE <i>3/6/63</i>     |  |                         | SEMICONDUCTOR DEVICE, DIODE, (VR)          |                             |                  |          |  |  |
| CHECKED <i>W. J. Jones</i> DATE <i>6/6/63</i> |  |                         | SPECIFICATION CONTROL DRAWING              |                             |                  |          |  |  |
| APPROVAL <i>W. J. Jones</i> 3/6/63            |  |                         |  |                             |                  |          |  |  |
| NASA APPROVAL <i>W. J. Jones</i>              |  |                         | CODE IDENT NO.                             | SIZE                        | NASA DRAWING NO. |          |  |  |
| MIT APPROVAL <i>W. J. Jones</i> 6/6/63        |  |                         |  | C                           | 1010257          |          |  |  |
| SCALE NONE                                    |  |                         | WT   | SHEET 2 OF 2                |                  |          |  |  |



NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER. IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

#### REQUIREMENTS:

##### GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER NASA DOCUMENT 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

ELECTRICAL CHARACTERISTICS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

MARKING: MARK UNITS PER MIL-STD-130 WITH MANUFACTURERS NAME OR SYMBOL, TYPE DESIGNATION, DATE CODE, LOT CODE, SERIAL NUMBER AND A BAND INDICATING CATHODE.

##### GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$

ELECTRICAL RATING: PER TABLE I

TOLERANCE:  $\pm 5\%$

ELECTRICAL SPECIFICATION: PER TABLE II

POWER DISSIPATION: 250 MILLIWATTS MAX, DERATED PER CURVE.

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002054.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER NASA DOCUMENT 1015404, CLASS 1.

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491 LEVEL A IN BOTH INSTANCES.

(1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

##### GROUP III (SPECIAL CONDITIONING BY SUPPLIER):

BURN IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

1. AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$
2. POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  CASE TEMPERATURE RATING.

DIODES WHICH FAIL TO MEET ALL INITIAL MEASUREMENTS AND THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN IN SHALL NOT BE ACCEPTABLE.

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN IN:

1. ZENER VOLTAGE ( $V_Z$ )
2. DYNAMIC IMPEDANCE ( $Z_{ZT}$ )

PARAMETRIC CHANGE LIMITS:

1. ZENER VOLTAGE:  $\pm 1\%$  OF INITIAL VALUE.
2. DYNAMIC IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING.

1010257

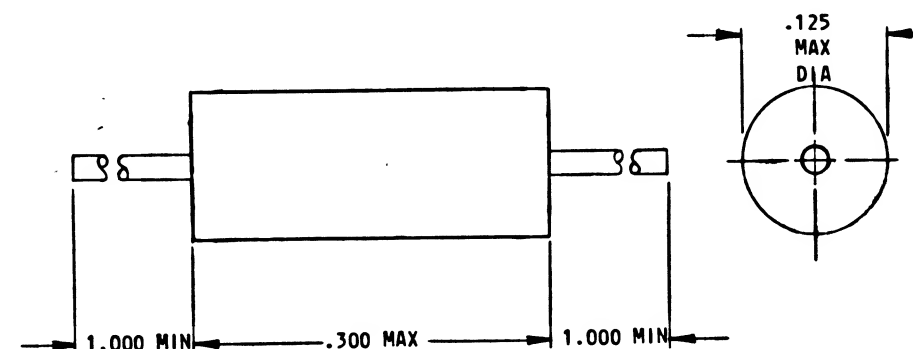
#### REVISIONS

| SYM | DESCRIPTION | DATE | APPROVAL |
|-----|-------------|------|----------|
| -   |             |      |          |

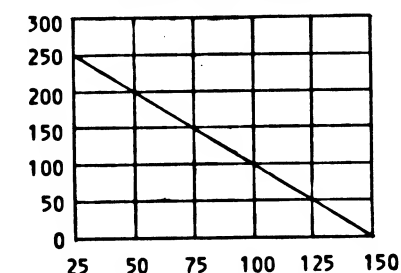
## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00497

DATE 3-6-63



TEMPERATURE RATING



MAXIMUM ALLOWABLE AMBIENT TEMPERATURE (°C)

|                           |         |
|---------------------------|---------|
|                           |         |
|                           |         |
|                           |         |
|                           |         |
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

1010257

|          |   |  |                  |
|----------|---|--|------------------|
| QTY REQD | PART OR IDENTIFYING NO.                     | NOMENCLATURE OR DESCRIPTION                | FIND NO.         |
|          |   | LIST OF MATERIALS                          |                  |
|          | MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS. | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |                  |
|          | DRAWN <i>D. Bergman</i> DATE 28 DEC 62      | SEMICONDUCTOR DEVICE, DIODE, (V R)         |                  |
|          | CHECKED <i>S.S. Apple</i> 1-6-63            | SPECIFICATION CONTROL DRAWING              |                  |
|          | APPROVAL <i>[Signature]</i> 3/6/63          |  |                  |
|          | APPROVAL                                    |  |                  |
|          | NASA APPROVAL <i>[Signature]</i>            | CODE IDENT NO. SIZE                        | NASA DRAWING NO. |
|          | MIT APPROVAL <i>[Signature]</i> 6/4/63      | C  | 1010257          |
|          |   | SCALE NONE WT                              | SHEET 1 OF 2     |

|             |   |
|-------------|---|
|             | UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES |
|             | TOLERANCES ON                                       |
|             | FRACTIONS DECIMALS ANGLES                           |
|             | $\pm$ $\pm$ $\pm$                                   |
|             | DO NOT SCALE THIS DRAWING                           |
|             | MATERIAL  |
|             | SEE NOTES   |
|             | HEAT TREATMENT                                      |
|             | NONE  |
| NEXT ASSY   | USED ON   |
| APPLICATION | FINAL FINISH  |
|             | NONE  |



NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY FOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

210257

1

| REVISIONS |             |      |          |
|-----------|-------------|------|----------|
| SYM       | DESCRIPTION | DATE | APPROVAL |
| -         |             |      |          |

| DASH NUMBER | MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) |                       |   |                                      |
|-------------|--|-----------------------|---|--------------------------------------|
|             | ZENER CURRENT (I <sub>ZM</sub> )   | POWER DISSIPATION (P) | ZENER CURRENT AT T <sub>A</sub> = 125°C | EIA TYPE DESIGNATION (FOR REFERENCE) |
|             | MA <sub>DC</sub>   | MW                    | MA <sub>DC</sub>                        |                                      |
| 1           | 10   | 250                   | 2                                       | 1N769-2                              |
| 2           | 10   | 250                   | 2                                       | 1N769-3                              |

| TABLE II   |            |                         |                      |      |       |       |
|--|------------|-------------------------|----------------------|------|-------|-------|
| ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C |            |                         |                      |      |       |       |
| PARAMETER  | CONDITIONS | SYMBOL                  | SPECIFICATION LIMITS |      |       |       |
|  |            |                         | MIN                  | MAX  | UNITS |       |
| ZENER VOLTAGE  |            |                         |                      |      |       |       |
|  | -001       | $I_{ZT} = 5 \text{ MA}$ | $V_Z$                | 22.8 | 25.2  | VOLTS |
|  | -002       | $I_{ZT} = 5 \text{ MA}$ | $V_Z$                | 24.7 | 27.3  | VOLTS |
| ZENER IMPEDANCE  |            |                         |                      |      |       |       |
|  | -001       | $I_{ZT} = 5 \text{ MA}$ | $Z_{ZT}$             | -    | 150   | OHMS  |
|  | -002       | $I_{ZT} = 5 \text{ MA}$ | $Z_{ZT}$             | -    | 150   | OHMS  |

FOR INFORMATION ONLY  
CLASS B RELEASE TDR No. 00497 DATE 3-6-0

MASTER

|   |                         |  |                  |
|---|-------------------------|--|------------------|
| QTY REQD                                    | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.         |
| LIST OF MATERIALS                           |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS. |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                         |                  |
| DRAWN <i>D. Brown</i> DATE <i>3/20/63</i>   |                         | SEMICONDUCTOR DEVICE, DIODE, (VR)<br>SPECIFICATION CONTROL DRAWING |                  |
| CHECKED <i>W. J. Hines</i> 6/20/63          |                         |  |                  |
| APPROVAL <i>W. J. Hines</i> 3/6/68          |                         |  |                  |
| NASA APPROVAL <i>W. J. Hines</i>            |                         | CODE IDENT NO.   | NASA DRAWING NO. |
| MIT APPROVAL <i>W. J. Hines</i>             |                         | SIZE<br>C  | 1010257          |
| APPLICATION                                 |                         | SCALE NONE   | WT SHEET 2 OF 2  |

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#### REQUIREMENTS:

##### GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: GOLD PLATED IRON NICKEL ALLOY (DUMET) PER NASA DOCUMENT 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

ELECTRICAL CHARACTERISTICS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

ZENER VOLTAGE STABILITY ( $\Delta V_Z$ )

MARKING: THE MANUFACTURER'S NAME, TRADEMARK, OR CODE, TYPE DESIGNATION, DATE CODE, LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, IN ACCORDANCE WITH MIL-STD-130.

##### GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$ .

ELECTRICAL RATING: PER TABLE II.

ELECTRICAL SPECIFICATION: PER TABLE II.

POWER DISSIPATION: 250 MILLIWATTS MAX  
50 MILLIWATTS AT  $125^{\circ}\text{C}$

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002034.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER NASA DOCUMENT 1015404, CLASS

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491 (LEVEL A) IN BOTH INSTANCES.

(1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

##### GROUP III (SPECIAL CONDITIONING BY SUPPLIER):

BURN IN: UNITS SHALL BE BURNED IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

1. AMBIENT TEMPERATURE:  $100^{\circ}\text{C}$ .
2. POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  CASE TEMPERATURE RATING.

DIODES WHICH FAIL TO MEET ALL INITIAL MEASUREMENTS AND THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN IN SHALL NOT BE ACCEPTABLE.

##### PARAMETRIC CHANGE LIMITS:

ZENER VOLTAGE:  $\pm 1\%$  OF INITIAL VALUE.

DYNAMIC IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE.

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

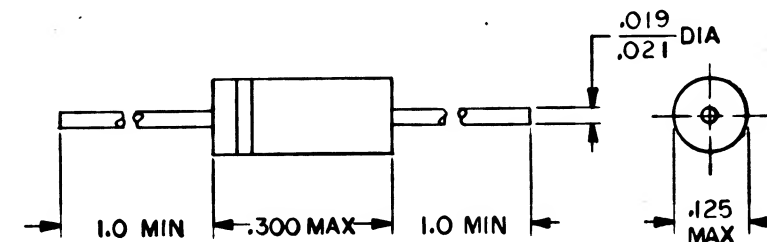
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING.

| REVISION STATUS OF SHEETS |         |
|---------------------------|---------|
| A                         | -       |
| SHEET 1                   | SHEET 2 |

NOTED

|             |         |
|-------------|---------|
|             |         |
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|             |         |
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|             |         |
|             |         |
| NEXT ASSY   | USED ON |
| APPLICATION |         |

|  |          |        |
|--|----------|--------|
| UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES |          |        |
| TOLERANCES ON  |          |        |
| FRACTIONS  | DECIMALS | ANGLES |
| $\pm$  | $\pm$    | $\pm$  |
| DO NOT SCALE THIS DRAWING                              |          |        |
| MATERIAL   |          |        |
| SEE NOTES  |          |        |
| HEAT TREATMENT   |          |        |
| NONE   |          |        |
| FINAL FINISH   |          |        |
| NONE   |          |        |



|  |                         |  |                  |  |  |
|--|-------------------------|--|------------------|--|--|
| QTY REQD                                     | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                                  | FIND NO.         |  |  |
|  |                         |  |                  |  |  |
| LIST OF MATERIALS                            |                         |  |                  |  |  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS   |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                   |                  |  |  |
| DRAWN <i>Q. Whelan</i> M. DATE <i>Feb 63</i> |                         | SEMICONDUCTOR DEVICE, DIODE<br>SPECIFICATION CONTROL DRAWING |                  |  |  |
| CHECKED <i>S. S. Amis</i> 6 Feb 63           |                         |  |                  |  |  |
| APPROVAL <i>W. J. Rector</i>                 |                         |  |                  |  |  |
| NASA APPROVAL <i>Jack D. Brown</i> 2/20/63   |                         | CODE IDENT NO.   | NASA DRAWING NO. |  |  |
| MIT APPROVAL <i>W. J. Rector</i> 2/20/63     |                         | SIZE<br>C  | 1010258          |  |  |
|  |                         | SCALE NONE   | WT               |  |  |
|  |                         | SHEET 1 OF 2   |                  |  |  |

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#### REQUIREMENTS:

##### GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: GOLD PLATED IRON NICKEL ALLOY (DUMET) PER NASA DOCUMENT 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

ELECTRICAL CHARACTERISTICS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

ZENER VOLTAGE STABILITY ( $\Delta V_Z$ )

MARKING: THE MANUFACTURER'S NAME, TRADEMARK, OR CODE, TYPE DESIGNATION, DATE CODE, LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, IN ACCORDANCE WITH MIL-STD-130.

##### GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$ .

ELECTRICAL RATING: PER TABLE II.

ELECTRICAL SPECIFICATION: PER TABLE II.

POWER DISSIPATION: 250 MILLIWATTS MAX  
50 MILLIWATTS AT  $125^{\circ}\text{C}$

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002034.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER NASA DOCUMENT 1015404, CLASS

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491 LEVEL A IN BOTH INSTANCES.

(1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

##### GROUP III (SPECIAL CONDITIONING BY SUPPLIER):

BURN IN: UNITS SHALL BE BURNED IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

1. AMBIENT TEMPERATURE:  $100^{\circ}\text{C}$ .

2. POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  CASE TEMPERATURE RATING.

DIODES WHICH FAIL TO MEET ALL INITIAL MEASUREMENTS AND THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN IN SHALL NOT BE ACCEPTABLE.

##### PARAMETRIC CHANGE LIMITS:

ZENER VOLTAGE:  $\pm 1\%$  OF INITIAL VALUE.

DYNAMIC IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE.

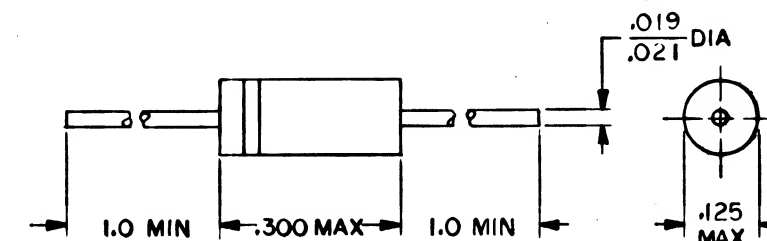
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING.

| 1         |   |         |          |
|-----------|---|---------|----------|
| REVISIONS |   |         |          |
| SYM       | DESCRIPTION                                   | DATE    | APPROVAL |
|           | SEE PROCUREMENT NOTE L                        |         |          |
| A         | REVISED PER TDRR 00513                        |         | WIK      |
| B         | REPLACED BY REV C WITH CHANGES PER TDRR 01780 | 6-26-63 | WIK      |

## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 8-20-63

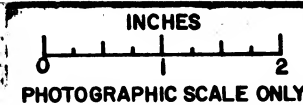


REPLACED BY REV C WITH CHANGES

|                           |         |
|---------------------------|---------|
| B                         | B       |
| A                         | -       |
| -                         | -       |
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

NOTES

|  |  |   |                             |                             |
|--|--|---|-----------------------------|-----------------------------|
| QTY REQ  |  | PART OR IDENTIFYING NO.   | NOMENCLATURE OR DESCRIPTION | FIND NO.                    |
| LIST OF MATERIALS  |  |   |                             |                             |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.  |  | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS  |                             |                             |
| DRAWN <i>Q. Whelan</i> 11/1/63<br>CHECKED <i>S. S. Arima</i> 6/26/63<br>APPROVAL <i>W. J. Boston</i><br>APPROVAL |  | SEMICONDUCTOR DEVICE, DIODE<br>SPECIFICATION CONTROL DRAWING                            |                             |                             |
| HEAT TREATMENT<br>NONE   |  | NASA APPROVAL <i>Jack B. Bernal</i> 2/26/63<br>MIT APPROVAL <i>W. J. Boston</i> 2/26/63 | CODE IDENT NO. SIZE<br>C    | NASA DRAWING NO.<br>1010258 |
| FINAL FINISH<br>NONE   |  | SCALE NONE  | WT                          | SHEET 1 OF 2                |





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TABLE I

| MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE = 25°C |                          |  |
|---|--------------------------|--|
| ZENER CURRENT<br>(I <sub>ZM</sub> )                                   | POWER DISSIPATION<br>(P) | EIA TYPE DESIGNATION<br>(REFERENCE ONLY) |
| MA <sub>DC</sub>  | MW                       |  |
| 30  | 250                      | 1N763-3                                  |

TABLE II

| ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) |                                       |                 |                      |       |       |
|---|---------------------------------------|-----------------|----------------------|-------|-------|
| PARAMETER   | CONDITIONS                            | SYMBOL          | SPECIFICATION LIMITS |       |       |
|   |                                       |                 | MIN                  | MAX   | UNITS |
| ZENER VOLTAGE   | I <sub>ZT</sub> = 10 MA               | V <sub>Z</sub>  | 7.125                | 7.875 | VOLTS |
| ZENER IMPEDANCE   | I <sub>ZT</sub> = 10 MA               | Z <sub>ZT</sub> |                      | 7.0   | OHMS  |
| VOLTAGE - TEMPERATURE   | T <sub>C</sub> = 25°C ± 1°C REFERENCE |                 |                      |       |       |
|   | T <sub>1</sub> = -55°C ± 2°C          | ΔV <sub>Z</sub> |                      | 0.3   | VOLTS |
|   | T <sub>2</sub> = +100°C ± 2°C         | ΔV <sub>Z</sub> |                      | 0.281 | VOLTS |

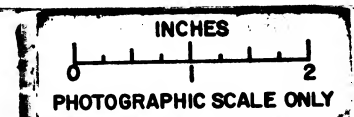
FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63

ⓑ REPLACED BY REV C WITH CHANGES

MASTER

|   |  |  |  |                             |  |          |
|---|--|--|--|-----------------------------|--|----------|
| QTY REQD                                      |  | PART OR IDENTIFYING NO.                    |  | NOMENCLATURE OR DESCRIPTION |  | FIND NO. |
| LIST OF MATERIALS                             |  |  |  |                             |  |          |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.   |  | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |  |                             |  |          |
| DRAWN <i>R. Anderson</i> DATE <i>5-24-63</i>  |  | SEMICONDUCTOR DEVICE, DIODE                |  |                             |  |          |
| CHECKED <i>S.S. Smith</i> DATE <i>1-24-63</i> |  | SPECIFICATION CONTROL DRAWING              |  |                             |  |          |
| APPROVAL <i>W.J. Beaton</i>                   |  | NASA APPROVAL <i>Jack Beaton</i> 2/20/63   |  |                             |  |          |
| APPROVAL                                      |  | NASA DRAWING NO. 1010258                   |  |                             |  |          |
| HEAT TREATMENT NONE                           |  | CODE IDENT NO. C                           |  | SCALE NONE WT               |  |          |
| FINAL FINISH NONE                             |  | MIT APPROVAL <i>W.J. Beaton</i> 2/20/63    |  | SHEET 2 OF 2                |  |          |
| NEXT ASSY                                     |  | USED ON                                    |  |                             |  |          |
| APPLICATION                                   |  |  |  |                             |  |          |



NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

C 1010258

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 61780 | 6-24-63 | WHL      |

#### REQUIREMENTS:

##### GENERAL:

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.

UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054 UNLESS MODIFIED OR AMENDED BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING. LIFE TEST CONDITIONS SHALL BE THE SAME AS BURN-IN CONDITIONS.

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH ND 1002129.

##### INSPECTION AND ACCEPTANCE:

##### MECHANICAL REQUIREMENTS:

LEAD DATA: GOLD PLATED IRON NICKEL ALLOY (DUMET) PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

MARKING: THE MANUFACTURER'S NAME, TRADEMARK, OR CODE, TYPE DESIGNATION; DATE CODE; AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, IN ACCORDANCE WITH MIL-STD-130.

ELECTRICAL REQUIREMENTS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

ZENER VOLTAGE TEMPERATURE STABILITY ( $\Delta V_Z$ )

##### DESIGN REQUIREMENTS:

MAXIMUM RATINGS: PER TABLE I

STORAGE TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$ .

POWER DISSIPATION: 250 MILLIWATTS MAX AT  $25^{\circ}\text{C}$  AMBIENT TEMP  
50 MILLIWATTS AT  $125^{\circ}\text{C}$

THERMAL RESISTANCE: (JUNCTION TO AMBIENT AIR WITH CLIPS  
1/2 INCH FROM DIODE BODY IN STILL FREE AIR)  $.500^{\circ}\text{C}/\text{MW}$

##### SPECIAL CONDITIONING BY SUPPLIER:

BURN-IN: UNITS SHALL BE BURNED IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

AMBIENT TEMPERATURE:  $100^{\circ}\text{C}$   $\pm 0^{\circ}\text{C}$   
 $-10^{\circ}\text{C}$

POWER DISSIPATION: 50 MILLIWATTS  
RATING.

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

ZENER VOLTAGE ( $V_Z$ )

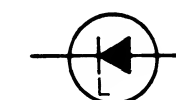
ZENER IMPEDANCE ( $Z_{ZT}$ )

THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.

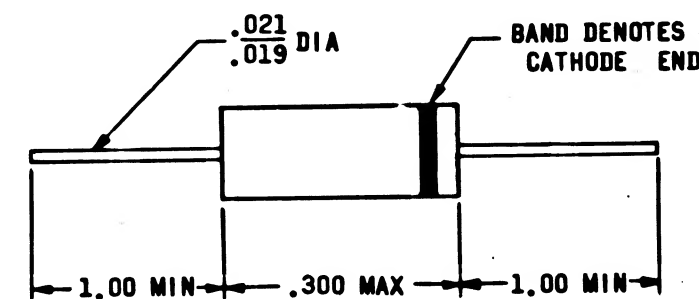
PARAMETRIC CHANGE LIMITS:

ZENER VOLTAGE:  $\pm 1\%$  OF INITIAL VALUE

ZENER IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE



GRAPHICAL SYMBOL



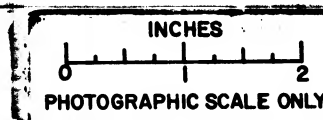
|                           |         |
|---------------------------|---------|
| C                         | C       |
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

© REPLACES REV (B) WITH CHANGE

|   |                         |  |                             |
|---|-------------------------|--|-----------------------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.                    |
| LIST OF MATERIALS   |                         |  |                             |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |                             |
| DRAWN: <i>[Signature]</i> DATE: <i>June 63</i><br>CHECKED: <i>Wilson</i> DATE: <i>June 63</i><br>APPROVAL: <i>A. B. Test 25 JUN 63</i><br>APPROVAL: _____ |                         | SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REGULATOR, SILICON,<br>AXIAL LEAD, GLASS BODY) |                             |
| HEAT TREATMENT  |                         | SPECIFICATION CONTROL DRAWING  |                             |
| NASA APPROVAL: <i>[Signature]</i><br>MIT APPROVAL: <i>[Signature]</i>   |                         | CODE IDENT NO. SIZE<br>C   | NASA DRAWING NO.<br>1010258 |
| SCALE NONE  |                         | WT   | SHEET 1 OF 2                |

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER



NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THEREBY.

#### REQUIREMENTS:

##### GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: GOLD PLATED IRON NICKEL ALLOY (DUMET) PER NASA DOCUMENT 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

ELECTRICAL CHARACTERISTICS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

ZENER VOLTAGE STABILITY ( $\Delta V_Z$ )

MARKING: THE MANUFACTURER'S NAME, TRADEMARK, OR CODE, TYPE DESIGNATION, DATE CODE, LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, IN ACCORDANCE WITH MIL-STD-130.

##### GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$ .

ELECTRICAL RATING: PER TABLE II.

ELECTRICAL SPECIFICATION: PER TABLE II.

POWER DISSIPATION: 250 MILLIWATTS MAX  
50 MILLIWATTS AT  $125^{\circ}\text{C}$

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002054.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER NASA DOCUMENT 1015404, CLASS

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491 LEVEL A IN BOTH INSTANCES.

(1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

##### GROUP III (SPECIAL CONDITIONING BY SUPPLIER):

BURN IN: UNITS SHALL BE BURNED IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

1. AMBIENT TEMPERATURE:  $100^{\circ}\text{C}$ .
2. POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  CASE TEMPERATURE RATING.

DIODES WHICH FAIL TO MEET ALL INITIAL MEASUREMENTS AND THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN IN SHALL NOT BE ACCEPTABLE.

##### PARAMETRIC CHANGE LIMITS:

ZENER VOLTAGE:  $\pm 1\%$  OF INITIAL VALUE.

DYNAMIC IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE.

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

##### PROCUREMENT NOTE:

- A WAIVE AS REQUIRED ALL INFORMATION PRESENTED ON THIS DRAWING EXCEPT LEAD MATERIAL SPECIFICATION AND PHYSICAL DIMENSIONS
- B UPON SPECIFIC INSTRUCTION BY TECHNICAL DIRECTIVE (TD) PROCURE THIS PART AS CHANGE SYMBOL BY ORDERING TO VENDOR CATALOGUE NUMBER & SPECIFICATIONS. REFERENCE ND 1002034
- C DISREGARD THIS NOTE IN ITS ENTIRETY IF REFERENCE IS MADE TO THIS DRAWING BY OTHER THAN REVISION SYMBOL (-)

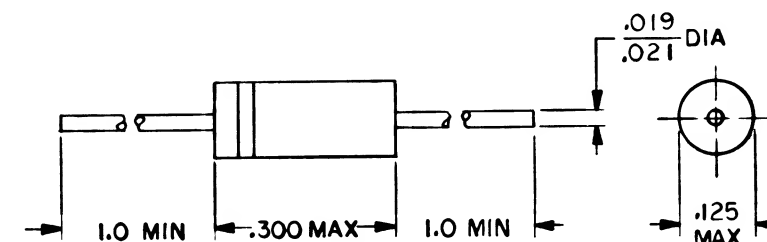
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING.

8520101

| REVISIONS |                        |      |          |
|-----------|------------------------|------|----------|
| SYM       | DESCRIPTION            | DATE | APPROVAL |
| —         | SEE PROCUREMENT NOTE 1 |      |          |

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63



|                           |         |
|---------------------------|---------|
|                           |         |
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|                           |         |
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

|   |         |   |                             |                             |
|---|---------|---|-----------------------------|-----------------------------|
| QTY REQD  |         | PART OR IDENTIFYING NO.   | NOMENCLATURE OR DESCRIPTION | FIND NO.                    |
| LIST OF MATERIALS   |         |   |                             |                             |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.<br>CONTRACT   |         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS  |                             |                             |
| DRAWN <u>Q. Wheeler</u> DATE <u>2/2/63</u><br>CHECKED <u>S. C. M. W. S. A. 6/2/63</u><br>APPROVAL <u>W. J. Beaton</u><br>APPROVAL   |         | SEMICONDUCTOR DEVICE, DIODE<br>SPECIFICATION CONTROL DRAWING                      |                             |                             |
| UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>FRACTIONS DECIMALS ANGLES<br>$\pm$ $\pm$ $\pm$<br>DO NOT SCALE THIS DRAWING<br>MATERIAL<br>SEE NOTES |         | NASA APPROVAL <u>John D. B. 2/2/63</u><br>MIT APPROVAL <u>W. J. Beaton 2/2/63</u> | CODE IDENT NO. SIZE<br>C    | NASA DRAWING NO.<br>1010258 |
| HEAT TREATMENT<br>NONE<br>FINAL FINISH<br>NONE  |         | SCALE NONE WT   | SHEET 1 OF 2                |                             |
| NEXT ASSY   | USED ON | APPLICATION   |                             |                             |



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TABLE I

| MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE = 25°C |                       |                                       |
|---|-----------------------|---------------------------------------|
| ZENER CURRENT (I <sub>ZM</sub> )                                      | POWER DISSIPATION (P) | EIA TYPE DESIGNATION (REFERENCE ONLY) |
| M <sub>ADC</sub>  | MW                    |                                       |
| 30  | 250                   | 1N763-3                               |

TABLE II

| ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) |                                       |                 |                      |       |       |
|---|---------------------------------------|-----------------|----------------------|-------|-------|
| PARAMETER   | CONDITIONS                            | SYMBOL          | SPECIFICATION LIMITS |       |       |
|   |                                       |                 | MIN                  | MAX   | UNITS |
| ZENER VOLTAGE   | I <sub>ZT</sub> = 10 MA               | V <sub>Z</sub>  | 7.125                | 7.875 | VOLTS |
| ZENER IMPEDANCE   | I <sub>ZT</sub> = 10 MA               | Z <sub>ZT</sub> |                      | 7.0   | OHMS  |
| VOLTAGE - TEMPERATURE   | T <sub>C</sub> = 25°C ± 1°C REFERENCE |                 |                      |       |       |
|   | T <sub>1</sub> = -55°C ± 2°C          | ΔV <sub>Z</sub> |                      | 0.3   | VOLTS |
|   | T <sub>2</sub> = +100°C ± 2°C         | ΔV <sub>Z</sub> |                      | 0.281 | VOLTS |

1010258

REVISIONS

| SYM | DESCRIPTION | DATE | APPROVAL |
|-----|-------------|------|----------|
| -   |             |      |          |

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63

MASTER

|  |                         |  |                  |
|--|-------------------------|--|------------------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                                  | FIND NO.         |
| LIST OF MATERIALS  |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                   |                  |
| DRAWN <u>R. Anderson</u> DATE <u>5-2-63</u><br>CHECKED <u>S. A. H. H. 1-2-63</u><br>APPROVAL <u>W. J. Beaton</u><br>APPROVAL |                         | SEMICONDUCTOR DEVICE, DIODE<br>SPECIFICATION CONTROL DRAWING |                  |
| NASA APPROVAL <u>Jack Beaton</u> 2/20/63<br>MIT APPROVAL <u>W. J. Beaton</u> 2/20/63   |                         | CODE IDENT NO.   | NASA DRAWING NO. |
| HEAT TREATMENT NONE<br>FINAL FINISH NONE   |                         | SIZE C   | 1010258          |
| NEXT ASSY USED ON APPLICATION  |                         | SCALE NONE WT  | SHEET 2 OF 2     |

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY FOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THEREBY.

#### REQUIREMENTS:

##### GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER NASA DOCUMENT 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

ELECTRICAL CHARACTERISTICS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

TEMPERATURE COEFFICIENT ( $T_{COEFF}$ )

MARKING: THE MANUFACTURER'S NAME, TRADEMARK, OR CODE: TYPE DESIGNATION, DATE CODE, LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART.

##### GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$

ELECTRICAL RATING: PER TABLE I

ELECTRICAL SPECIFICATION: PER TABLE II

POWER DISSIPATION: 250 MILLIWATTS MAX

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002054.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER NASA DOCUMENT 1015404, CLASS I.

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491 LEVEL A IN BOTH INSTANCES.

- (1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

##### GROUP III (SPECIAL CONDITIONING BY SUPPLIER):

BURN IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

1. AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$
2. POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  CASE TEMPERATURE RATING.

DIODES WHICH FAIL TO MEET ALL INITIAL MEASUREMENTS AND THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN IN SHALL NOT BE ACCEPTABLE.

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN IN:

1. ZENER VOLTAGE ( $V_Z$ )
2. DYNAMIC IMPEDANCE ( $Z_{ZT}$ )

PARAMETRIC CHANGE LIMITS:

1. ZENER VOLTAGE:  $\pm 1\%$  OF INITIAL VALUE
2. ZENER IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

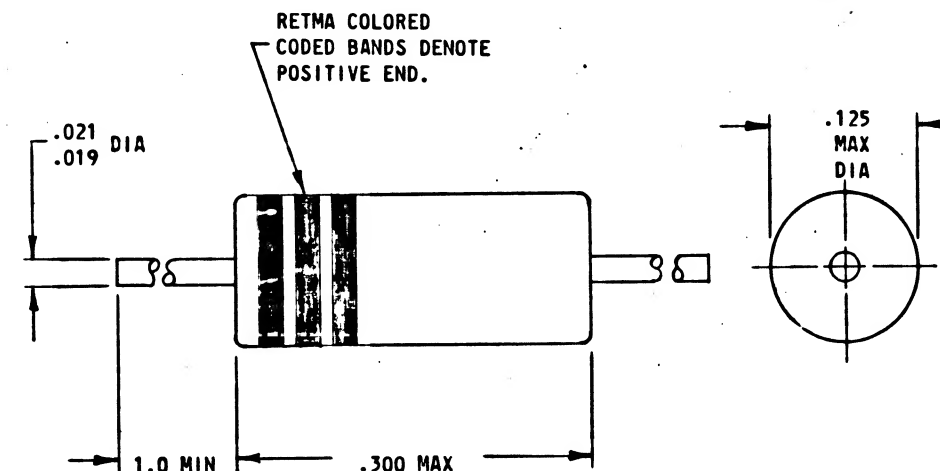
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

| REVISIONS |                        |      |          |
|-----------|------------------------|------|----------|
| SYM       | DESCRIPTION            | DATE | APPROVAL |
| —         | SEE PROCUREMENT NOTE   |      |          |
| A         | REVISED PER TDRR 00513 |      | 4K       |

## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63



| A                         | —       |
|---------------------------|---------|
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

|   |                 |
|---|-----------------|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES |                 |
| TOLERANCES ON                                       |                 |
| FRACTIONS   | DECIMALS ANGLES |
| $\pm$   | $\pm$ $\pm$     |
| DO NOT SCALE THIS DRAWING                           |                 |
| MATERIAL  |                 |
| SEE NOTES   |                 |
| HEAT TREATMENT                                      |                 |
| NONE  |                 |
| FINAL FINISH  |                 |
| NONE  |                 |
| NEXT ASSY   | USED ON         |
| APPLICATION   |                 |

|  |  |                         |  |  |      |                  |  |
|--|--|-------------------------|--|--|------|------------------|--|
| QTY REQD                                       |  | PART OR IDENTIFYING NO. |  | NOMENCLATURE OR DESCRIPTION                                      |      | FIND NO.         |  |
| LIST OF MATERIALS                              |  |                         |  |  |      |                  |  |
| MIT<br>INSTRUMENTATION LAB<br>CAMBRIDGE, MASS. |  |                         |  | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                       |      |                  |  |
| DWG. NO. CONTRACT                              |  |                         |  | SEMICONDUCTOR DEVICE, DIODE<br><br>SPECIFICATION CONTROL DRAWING |      |                  |  |
| DRAWN <i>Ray Whelan</i> DATE <i>11/2/62</i>    |  |                         |  |  |      |                  |  |
| CHECKED <i>J. S. P. Smith</i> 3/9/63           |  |                         |  |  |      |                  |  |
| APPROVAL <i>W. J. Beatty</i>                   |  |                         |  |  |      |                  |  |
| APPROVAL                                       |  |                         |  |  |      |                  |  |
| NASA APPROVAL <i>Jack B. ...</i> 2/20/63       |  |                         |  | CODE IDENT NO.   | SIZE | NASA DRAWING NO. |  |
|  |  |                         |  |  | C    | 1010259          |  |
| MIT APPROVAL <i>W. J. Beatty</i> 2/20/63       |  |                         |  | SCALE NONE   | WT   | SHEET 1 OF 2     |  |

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#### REQUIREMENTS:

##### GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER NASA DOCUMENT 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

ELECTRICAL CHARACTERISTICS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

TEMPERATURE COEFFICIENT ( $T_{COEFF}$ )

MARKING: THE MANUFACTURER'S NAME, TRADEMARK, OR CODE: TYPE DESIGNATION, DATE CODE, LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART.

##### GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$

ELECTRICAL RATING: PER TABLE I

ELECTRICAL SPECIFICATION: PER TABLE II

POWER DISSIPATION: 250 MILLIWATTS MAX

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002054.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER NASA DOCUMENT 1015404, CLASS I.

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491 LEVEL A IN BOTH INSTANCES.

(1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

##### GROUP III (SPECIAL CONDITIONING BY SUPPLIER):

BURN IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

1. AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$

2. POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  CASE TEMPERATURE RATING.

DIODES WHICH FAIL TO MEET ALL INITIAL MEASUREMENTS AND THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN IN SHALL NOT BE ACCEPTABLE.

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN IN:

1. ZENER VOLTAGE ( $V_Z$ )

2. DYNAMIC IMPEDANCE ( $Z_{ZT}$ )

PARAMETRIC CHANGE LIMITS:

1. ZENER VOLTAGE:  $\pm 1\%$  OF INITIAL VALUE

2. ZENER IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

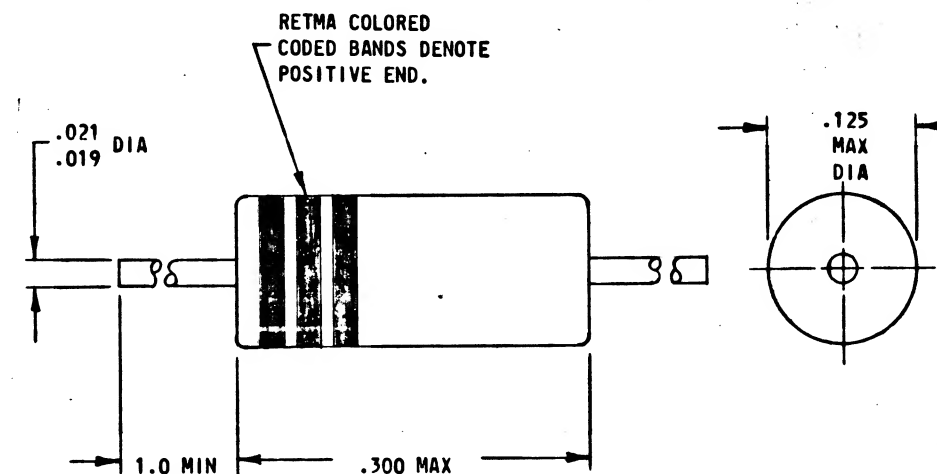
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION                                  | DATE    | APPROVAL |
| B         | SEE PROCUREMENT NOTE                         |         |          |
| A         | REVISED PER TDR 00513                        |         | WK       |
| B         | REPLACED BY REV C WITH CHANGES PER TDR 02605 | 8/14/63 | WK       |

## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63



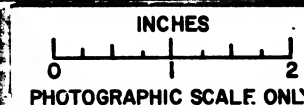
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| B                         | B       |
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| A                         | -       |
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| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

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| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON |          |        |
| FRACTIONS   | DECIMALS | ANGLES |
| $\pm$   | $\pm$    | $\pm$  |
| DO NOT SCALE THIS DRAWING   |          |        |
| MATERIAL  |          |        |
| SEE NOTES   |          |        |
| HEAT TREATMENT  |          |        |
| NONE  |          |        |
| FINAL FINISH  |          |        |
| NONE  |          |        |
| NEXT ASSY   | USED ON  |        |
| APPLICATION   |          |        |

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|--|--|-------------------------|--|--|--|---------|--|------------------|--|
| QTY REQD   |  | PART OR IDENTIFYING NO. |  | NOMENCLATURE OR DESCRIPTION                                      |  | FIG NO. |  |                  |  |
| LIST OF MATERIALS                                    |  |                         |  |  |  |         |  |                  |  |
| MIT<br>INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.       |  |                         |  | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                       |  |         |  |                  |  |
| DWS. NO. CONTRACT                                    |  |                         |  | SEMICONDUCTOR DEVICE, DIODE<br><br>SPECIFICATION CONTROL DRAWING |  |         |  |                  |  |
| DRAWN <u>Ray Stuber</u> DATE <u>2/20/63</u>          |  |                         |  |  |  |         |  |                  |  |
| CHECKED <u>Ed. Labadie</u> <u>3/19/63</u>            |  |                         |  |  |  |         |  |                  |  |
| APPROVAL <u>W. J. Beiter</u>                         |  |                         |  |  |  |         |  |                  |  |
| APPROVAL _____                                       |  |                         |  |  |  |         |  |                  |  |
| NASA APPROVAL <u>Jacob Bernard</u><br><u>2/20/63</u> |  |                         |  | CODE IDENT NO.   |  | SIZE    |  | NASA DRAWING NO. |  |
| MIT APPROVAL <u>W. J. Beiter</u> <u>2/20/63</u>      |  |                         |  |  |  | C       |  | 1010259          |  |
|  |  |                         |  | SCALE NONE   |  | WT      |  | SHEET 1 OF 2     |  |





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TABLE I

| MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE = 25°C |                       |   |                                      |
|---|-----------------------|---|--------------------------------------|
| ZENER CURRENT (I <sub>ZM</sub> )                                      | POWER DISSIPATION (P) | TEMPERATURE COEFFICIENT (T <sub>COEFF</sub> ) | EIA TYPE DESIGNATION (FOR REFERENCE) |
| MA <sub>DC</sub>  | MW                    | %/°C  |                                      |
| 35  | 250                   | ±.002   | 1N825                                |

TABLE II

| ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) |                          |                 |                      |     |       |
|---|--------------------------|-----------------|----------------------|-----|-------|
| PARAMETER   | CONDITIONS               | SYMBOL          | SPECIFICATION LIMITS |     |       |
|   |                          |                 | MIN                  | MAX | UNITS |
| ZENER VOLTAGE   | I <sub>ZT</sub> = 7.5 MA | V <sub>Z</sub>  | 5.9                  | 6.5 | VOLTS |
| ZENER IMPEDANCE   | I <sub>ZT</sub> = 7.5 MA | Z <sub>ZT</sub> | -                    | 15  | OHMS  |

B 1010259

| REVISIONS |   |         |          |
|-----------|---|---------|----------|
| SYM       | DESCRIPTION                                   | DATE    | APPROVAL |
| -         | SEE PROCUREMENT NOTE                          |         |          |
| B         | REPLACED BY REV C WITH CHANGES PER TDRR 02605 | 8/14/63 | WK       |

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63

ⓑ REPLACED BY REV C WITH CHANGES

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|             |         |   |
|-------------|---------|---|
|             |         | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON |
|             |         | FRACTIONS DECIMALS ANGLES   |
|             |         | ± ± ±   |
|             |         | DO NOT SCALE THIS DRAWING   |
|             |         | MATERIAL  |
|             |         | SEE NOTES   |
|             |         | HEAT TREATMENT  |
|             |         | NONE  |
| NEXT ASSY   | USED ON | FINAL FINISH  |
|             |         | NONE  |
| APPLICATION |         |   |

|   |                         |  |                             |
|---|-------------------------|--|-----------------------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                                  | FIND NO.                    |
| LIST OF MATERIALS   |                         |  |                             |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                   |                             |
| DRAWN <i>Ray Smith</i> DATE 3/8/63<br>CHECKED <i>S.S. Padgett</i> 3/9/63<br>APPROVAL <i>W.J. Boston</i><br>APPROVAL |                         | SEMICONDUCTOR DEVICE, DIODE<br>SPECIFICATION CONTROL DRAWING |                             |
| NASA APPROVAL <i>Jack Baran</i> 2/20/63<br>MIT APPROVAL <i>W.J. Boston</i> 2/20/63                                  |                         | CODE IDENT NO. SIZE<br>C                                     | NASA DRAWING NO.<br>1010259 |
| SCALE NONE WT   |                         | SHEET 2 OF 2   |                             |



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1010259

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 8/14/63 | WJL      |

#### REQUIREMENTS:

##### GENERAL:

INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.  
SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.  
UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054. LIFE TEST CONDITIONS SHALL BE THE SAME AS BURN-IN CONDITIONS.  
PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH ND 1002129.

##### INSPECTION AND ACCEPTANCE:

###### MECHANICAL REQUIREMENTS:

LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

MARKING: THE MANUFACTURER'S NAME, TRADEMARK OR CODE; NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER; AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER MIL-STD-130.

ELECTRICAL SPECIFICATIONS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

TEMPERATURE COEFFICIENT ( $T_{COEFF}$ )

##### DESIGN REQUIREMENTS:

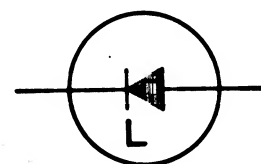
ELECTRICAL SPECIFICATIONS: PER TABLE II

MAXIMUM RATINGS: PER TABLE I

STORAGE AND JUNCTION TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$

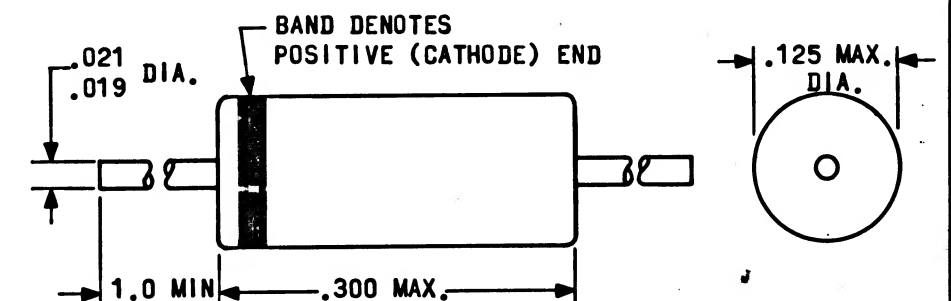
POWER DISSIPATION: 400 MILLIWATTS MAX

THERMAL RESISTANCE: (JUNCTION TO AMBIENT AIR WITH CLIPS 1/2 INCH FROM BODY OF DIODE IN STILL FREE AIR):  $.313^{\circ}\text{C}/\text{MW}$  MAXIMUM.



GRAPHICAL SYMBOL

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



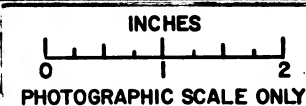
REPLACES REV(B) WITH CHANGE

| C       | C       |
|---------|---------|
| SHEET 1 | SHEET 2 |

REVISION STATUS OF SHEETS

|   |         |
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| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ± |         |
| DO NOT SCALE THIS DRAWING   |         |
| MATERIAL SEE REQUIREMENTS   |         |
| HEAT TREATMENT NONE   |         |
| FINAL FINISH NONE   |         |
| NEXT ASSY   | USED ON |
| APPLICATION   |         |

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| QTY REQ  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.         |
| LIST OF MATERIALS  |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE MASS<br>DWE NO. 9-487<br>DRAWN BY H. Patterson DATE 28 JUL 63 |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |                  |
| CHECKED BY A. R. Test DATE 8/14/63   |                         | SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY) |                  |
| APPROVAL BY W. J. R. DATE 8/14/63  |                         | SPECIFICATION CONTROL DRAWING  |                  |
| NASA APPROVAL BY W. J. R. DATE 8/14/63   |                         | CODE IDENT NO.   | NASA DRAWING NO. |
| MIT APPROVAL BY W. J. R. DATE 8/14/63  |                         | C  | 1010259          |
| SCALE NONE   |                         | WT   | SHEET 1 OF 2     |



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|           |  |         |          |
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| C         |  | 6920101 |          |
| REVISIONS |  |         |          |
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 8/14/63 | W.H.     |

**SPECIAL CONDITIONING BY SUPPLIER:**  
**BURN-IN:** UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:  
AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$   
POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  AMBIENT TEMPERATURE RATING.  
THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:  
ZENER VOLTAGE  
ZENER IMPEDANCE  
BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.  
PARAMETRIC CHANGE LIMITS:  
ZENER VOLTAGE:  $\pm .01\%$  OF INITIAL VALUE  
ZENER IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

| TABLE I   |                       |   |  |
|---|-----------------------|---|--|
| MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE = $25^{\circ}\text{C}$ |                       |   |  |
| ZENER CURRENT (IZM)   | POWER DISSIPATION (P) | EIA TYPE DESIGNATION (FOR REFERENCE ONLY) |  |
| MA DC   | MW                    |   |  |
| 65  | 400                   | 1N825                                     |  |

| TABLE II  |                           |          |                      |        |                       |
|---|---------------------------|----------|----------------------|--------|-----------------------|
| ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = $25^{\circ}\text{C}$ (UNLESS OTHERWISE SPECIFIED) |                           |          |                      |        |                       |
| PARAMETER   | CONDITIONS                | SYMBOL   | SPECIFICATION LIMITS |        |                       |
|   |                           |          | MIN                  | MAX    | UNITS                 |
| ZENER VOLTAGE   | $I_{ZT} = 7.5 \text{ MA}$ | $V_Z$    | 6.1                  | 6.5    | VOLTS                 |
| ZENER IMPEDANCE   | $I_{ZT} = 7.5 \text{ MA}$ | $Z_{ZT}$ | 6                    | 15     | OHMS                  |
| TEMPERATURE COEFFICIENT   | $I_{ZT} = 6 \text{ MA}$   | $T_C$    | -.001                | -.003  | $\%/^{\circ}\text{C}$ |
| TEMPERATURE COEFFICIENT   | $I_{ZT} = 4 \text{ MA}$   | $T_C$    | -.0015               | -.0055 | $\%/^{\circ}\text{C}$ |
| TEMPERATURE COEFFICIENT   | $I_{ZT} = 2 \text{ MA}$   | $T_C$    | -.005                | -.015  | $\%/^{\circ}\text{C}$ |

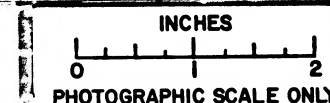
$\Delta T = +30^{\circ}\text{C TO } +40^{\circ}\text{C}$   
 $T_{REF} = +30^{\circ}\text{C}$

**NOTES:**  
1. ALL SPECIFICATIONS ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.  
2. DYNAMIC IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL  
$$Z_Z = \frac{E(AC)}{I(AC)}$$

|             |         |   |
|-------------|---------|---|
|             |         | UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES |
|             |         | $\pm$ $\pm$ $\pm$   |
|             |         | DO NOT SCALE THIS DRAWING   |
|             |         | MATERIAL  |
|             |         | HEAT TREATMENT  |
|             |         | FINAL FINISH  |
| NEXT ASSY   | USED ON |   |
| APPLICATION |         |   |

©REPLACES REV(B) WITH CHANGE

|  |                         |   |          |
|--|-------------------------|---|----------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION   | FIND NO. |
| LIST OF MATERIALS  |                         |   |          |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DWE NO. CONTRACT 9-497<br>DRAWN BY J. Patterson DATE 29 JUL 63<br>CHECKED WILSON 1 AUG 63<br>APPROVAL A. A. Test 8/11/63<br>APPROVAL |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS<br>SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY)<br>SPECIFICATION CONTROL DRAWING<br>NASA APPROVAL W. J. Rhine 8-1-63<br>MIT APPROVAL W. J. Rhine 8/14/63 |          |
| CODE IDENT NO.   | SIZE                    | NASA DRAWING NO.  |          |
|  | C                       | 1010259   |          |
| SCALE  | WT                      | SHEET 2 OF 2  |          |





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D 6520101

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 8/14/63 | WK       |
| D         | REVISED PER TDRR 03390   | 7/26/63 | JH       |

#### REQUIREMENTS:

D

##### GENERAL:

INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.  
SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.  
UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054. LIFE TEST CONDITIONS SHALL BE THE SAME AS BURN-IN CONDITIONS.  
PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH ND 1002129.

##### INSPECTION AND ACCEPTANCE:

###### MECHANICAL REQUIREMENTS:

LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

MARKING: THE MANUFACTURER'S NAME, TRADEMARK OR CODE; NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER; AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER MIL-STD-130.

###### ELECTRICAL SPECIFICATIONS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

TEMPERATURE COEFFICIENT ( $T_{COEFF}$ )

##### DESIGN REQUIREMENTS:

ELECTRICAL SPECIFICATIONS: PER TABLE II

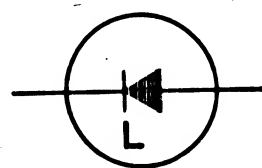
MAXIMUM RATINGS: PER TABLE I

STORAGE AND JUNCTION TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$

POWER DISSIPATION: 400 MILLIWATTS MAX

THERMAL RESISTANCE: (JUNCTION TO AMBIENT AIR WITH CLIPS 1/2 INCH FROM BODY OF DIODE IN STILL FREE AIR):  $.313^{\circ}\text{C}/\text{MW}$  MAXIMUM.

B



GRAPHICAL SYMBOL

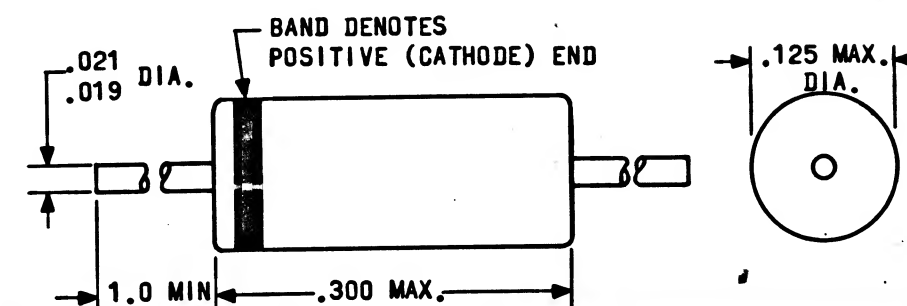
A

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

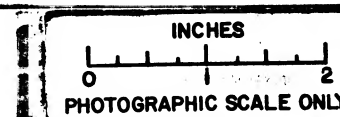
|                           |         |
|---------------------------|---------|
| D                         | D       |
| C                         | C       |
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

|   |         |
|---|---------|
| UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>FRACTIONS DECIMALS ANGLES<br>± ± ± |         |
| DO NOT SCALE THIS DRAWING   |         |
| MATERIAL<br>SEE REQUIREMENTS  |         |
| HEAT TREATMENT<br>NONE  |         |
| FINAL FINISH<br>NONE  |         |
| NEXT ASSY   | USED ON |
| APPLICATION   |         |



© REPLACES REV(B) WITH CHANGE

|  |                         |  |                             |
|--|-------------------------|--|-----------------------------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.                    |
| LIST OF MATERIALS  |                         |  |                             |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE MASS<br>DWS NO. CONTRACT 9-497<br>DRAWN BY H. Peterson DATE 29 JUL 63 |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |                             |
| CHECKED<br>APPROVAL J. R. Tett 8/14/63   |                         | SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY) |                             |
| APPROVAL<br>NASA APPROVAL W. J. Rhine 8-14-63<br>MIT APPROVAL W. J. Rhine 8-14-63                          |                         | CODE IDENT NO. SIZE<br>C   | NASA DRAWING NO.<br>1010259 |
| SCALE NONE   |                         | WT   | SHEET 1 OF 2                |





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6520101

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 8/14/63 | WK       |
| D         | REVISED PER TDRR 03390   | 9/26/63 | WA       |

**SPECIAL CONDITIONING BY SUPPLIER:**

**BURN-IN:** UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$

POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  AMBIENT TEMPERATURE RATING.

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

ZENER VOLTAGE

ZENER IMPEDANCE

BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT.

THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.

**PARAMETRIC CHANGE LIMITS:**

ZENER VOLTAGE:  $\pm .01\%$  OF INITIAL VALUE

ZENER IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

TABLE I

MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE =  $25^{\circ}\text{C}$

| ZENER CURRENT (IZM) | POWER DISSIPATION (P) | EIA TYPE DESIGNATION (FOR REFERENCE ONLY) |
|---------------------|-----------------------|---|
| MAJC                | MW                    |   |
| 65                  | 400                   | 1N825                                     |

TABLE II

ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE =  $25^{\circ}\text{C}$  (UNLESS OTHERWISE SPECIFIED)

| PARAMETER               | CONDITIONS                | SYMBOL   | SPECIFICATION LIMITS |       |                       |
|-------------------------|---------------------------|----------|----------------------|-------|-----------------------|
|                         |                           |          | MIN                  | MAX   | UNITS                 |
| ZENER VOLTAGE           | $I_{ZT} = 7.5 \text{ MA}$ | $V_Z$    | 6.15                 | 6.5   | VOLTS                 |
| ZENER IMPEDANCE         | $I_{ZT} = 7.5 \text{ MA}$ | $Z_{ZT}$ | —                    | 15    | OHMS                  |
| TEMPERATURE COEFFICIENT | $I_{ZT} = 7.5 \text{ MA}$ | $T_C$    | -.002                | +.002 | %/ $^{\circ}\text{C}$ |

$T = +55^{\circ}\text{C}$  TO  $+100^{\circ}$   
 $T_{REF} = +25^{\circ}\text{C}$

**NOTES:**

1. ALL SPECIFICATIONS ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.

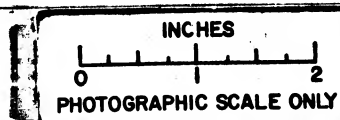
2. DYNAMIC IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL

$$(Z_Z = \frac{E(AC)}{I(AC)})$$

NOTES

© REPLACES REV(B) WITH CHANGE

|   |                         |  |                  |
|---|-------------------------|--|------------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.         |
| LIST OF MATERIALS   |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DWE NO. CONTRACT 9-497<br>DRAWN BY J. H. Patterson DATE 29 JUL 63<br>CHECKED BY WILSON 1 AUG 63<br>APPROVAL BY A. R. Test 8/11/63<br>APPROVAL |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |                  |
| HEAT TREATMENT  |                         | SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY) |                  |
| FINAL FINISH  |                         | SPECIFICATION CONTROL DRAWING  |                  |
| NASA APPROVAL   | MIT APPROVAL            | CODE IDENT NO. SIZE  | NASA DRAWING NO. |
|   |                         | C  | 1010259          |
| APPLICATION   |                         | SCALE  | WT               |
|   |                         |  | SHEET 2 OF 2     |



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#### REQUIREMENTS:

D

##### GENERAL:

INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.  
SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.  
UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054. LIFE TEST CONDITIONS SHALL BE THE SAME AS BURN-IN CONDITIONS.  
PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH ND 1002129.

##### INSPECTION AND ACCEPTANCE:

##### MECHANICAL REQUIREMENTS:

LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

C

MARKING: THE MANUFACTURER'S NAME, TRADEMARK OR CODE; NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER; AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER MIL-STD-130.

##### ELECTRICAL SPECIFICATIONS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

TEMPERATURE COEFFICIENT ( $T_{COEFF}$ )

##### DESIGN REQUIREMENTS:

ELECTRICAL SPECIFICATIONS: PER TABLE II

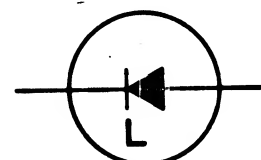
MAXIMUM RATINGS: PER TABLE I

STORAGE AND JUNCTION TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$

POWER DISSIPATION: 400 MILLIWATTS MAX

THERMAL RESISTANCE: (JUNCTION TO AMBIENT AIR WITH CLIPS 1/2 INCH FROM BODY OF DIODE IN STILL FREE AIR):  $.313^{\circ}\text{C}/\text{MW}$  MAXIMUM.

B



GRAPHICAL SYMBOL

A

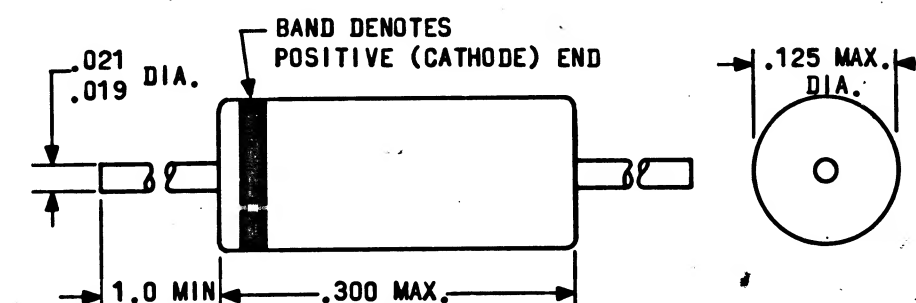
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

2

E 6920101

1

| REVISIONS |  |           |          |
|-----------|--|-----------|----------|
| SYM       | DESCRIPTION  | DATE      | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 8/14/63   | WK       |
| D         | REVISED PER TDRR 03390   | 7/26/63   | JW       |
| E         | REVISED PER TDRR 03969   | 15 Oct 63 | WK       |

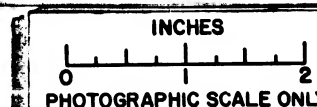


© REPLACES REV(B) WITH CHANGE

|                           |         |
|---------------------------|---------|
| E                         | E       |
| D                         | D       |
| C                         | C       |
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

|   |                 |
|---|-----------------|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES |                 |
| TOLERANCES ON                                       |                 |
| FRACTIONS   | DECIMALS ANGLES |
| = ± ± ±   |                 |
| DO NOT SCALE THIS DRAWING                           |                 |
| MATERIAL  |                 |
| SEE REQUIREMENTS                                    |                 |
| HEAT TREATMENT                                      |                 |
| NONE  |                 |
| FINAL FINISH  |                 |
| NONE  |                 |
| NEXT ASSY   | USED ON         |
| APPLICATION   |                 |

|  |                         |  |          |
|--|-------------------------|--|----------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO. |
| LIST OF MATERIALS  |                         |  |          |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE MASS<br>DWS NO. 9-497<br>DRAWN BY H. K. Peterson DATE 29 JUL 63 |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |          |
| CHECKED BY J. R. Felt DATE 8/14/63   |                         | SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY) |          |
| APPROVAL BY [Signature]  |                         | SPECIFICATION CONTROL DRAWING  |          |
| NASA APPROVAL BY [Signature] 8-14-63   |                         | CODE IDENT NO.   | SIZE     |
| MIT APPROVAL BY [Signature]  |                         | C  | 1010259  |
|  |                         | SCALE NONE   | WT       |
|  |                         | SHEET 1 OF 2   |          |



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#### SPECIAL CONDITIONING BY SUPPLIER:

- D BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:  
AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$   
POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  AMBIENT TEMPERATURE RATING.

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

ZENER VOLTAGE  
ZENER IMPEDANCE

BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT.

C THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.

#### PARAMETRIC CHANGE LIMITS:

ZENER VOLTAGE:  $\pm .01\%$  OF INITIAL VALUE

ZENER IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

TABLE I

MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE =  $25^{\circ}\text{C}$

| ZENER CURRENT<br>( $I_{ZM}$ ) | POWER DISSIPATION<br>(P) | EIA TYPE DESIGNATION<br>(FOR REFERENCE ONLY) |
|-------------------------------|--------------------------|--|
| MA DC                         | MW                       |  |
| 65                            | 400                      | 1N825  |

TABLE II

ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE =  $25^{\circ}\text{C}$  (UNLESS OTHERWISE SPECIFIED)

| PARAMETER               | CONDITIONS                | SYMBOL   | SPECIFICATION LIMITS |        |                       |
|-------------------------|---------------------------|----------|----------------------|--------|-----------------------|
|                         |                           |          | MIN                  | MAX    | UNITS                 |
| ZENER VOLTAGE           | $I_{ZT} = 7.5 \text{ MA}$ | $V_Z$    | 6.15                 | 6.5    | VOLTS                 |
| ZENER IMPEDANCE         | $I_{ZT} = 7.5 \text{ MA}$ | $Z_{ZT}$ | —                    | 15     | OHMS                  |
| TEMPERATURE COEFFICIENT | $I_{ZT} = 7.5 \text{ MA}$ | $T_C$    | -0.002               | +0.002 | %/ $^{\circ}\text{C}$ |

$T = -55^{\circ}\text{C}$  TO  $+100^{\circ}\text{C}$   
 $T_{REF} = +25^{\circ}\text{C}$

#### NOTES:

- A 1. ALL SPECIFICATIONS ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.  
2. DYNAMIC IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL

$$Z_Z = \frac{E(AC)}{I(AC)}$$

POSTED

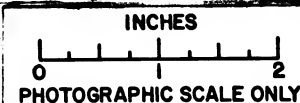
1010259

#### REVISIONS

| SYM | DESCRIPTION  | DATE     | APPROVAL |
|-----|--|----------|----------|
| C   | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 8/14/63  | WK       |
| D   | REVISED PER TDRR 03390   | 9/26/63  | WK       |
| E   | REVISED PER TDRR 03969   | 12/26/63 | WK       |

© REPLACES REV(B) WITH CHANGE

|   |                         |  |                             |
|---|-------------------------|--|-----------------------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.                    |
| LIST OF MATERIALS   |                         |  |                             |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DWS NO. 371<br>CONTRACT 9-497   |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |                             |
| DRAWN BY <i>J. H. Peterson</i> DATE 29 JUL 63<br>CHECKED <i>WILSON</i> 1 AUG 63<br>APPROVAL <i>D. A. Test</i> 8/11/63 |                         | SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY) |                             |
| DO NOT SCALE THIS DRAWING<br>MATERIAL   |                         | SPECIFICATION CONTROL DRAWING  |                             |
| HEAT TREATMENT  |                         | NASA APPROVAL <i>W. J. Rhine</i> 8-14-63   | CODE IDENT NO. SIZE<br>C    |
| FINAL FINISH  |                         | MIT APPROVAL <i>W. J. Rhine</i> 8/14/63  | NASA DRAWING NO.<br>1010259 |
| NEXT ASSY   | USED ON                 | SCALE  | WT                          |
| APPLICATION   |                         | SHEET 2 OF 2   |                             |





NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

# REQUIREMENTS:

## 1. GENERAL:

- INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
- SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
- UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054. LIFE TEST CONDITIONS SHALL BE THE SAME AS BURN-IN CONDITIONS.
- PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH ND 1002129.

## 2. INSPECTION AND ACCEPTANCE:

### A. MECHANICAL REQUIREMENTS:

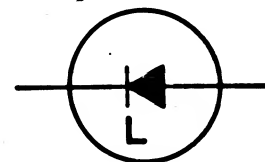
- LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
- MARKING: THE MANUFACTURER'S NAME, TRADEMARK OR CODE; NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER; AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.

### B. ELECTRICAL SPECIFICATIONS: PER TABLE II

- ZENER VOLTAGE ( $V_Z$ )
- ZENER IMPEDANCE ( $Z_{ZT}$ )
- TEMPERATURE COEFFICIENT ( $T_{COEFF}$ )

## 3. DESIGN REQUIREMENTS:

- ELECTRICAL SPECIFICATIONS: PER TABLE II
- MAXIMUM RATINGS: PER TABLE I
- STORAGE AND JUNCTION TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$
- POWER DISSIPATION: 400 MILLIWATTS MAX
- THERMAL RESISTANCE: (JUNCTION TO AMBIENT AIR WITH CLIPS 1/2 INCH FROM BODY OF DIODE IN STILL FREE AIR):  $.313^{\circ}\text{C}/\text{MW}$  MAXIMUM.



GRAPHICAL SYMBOL

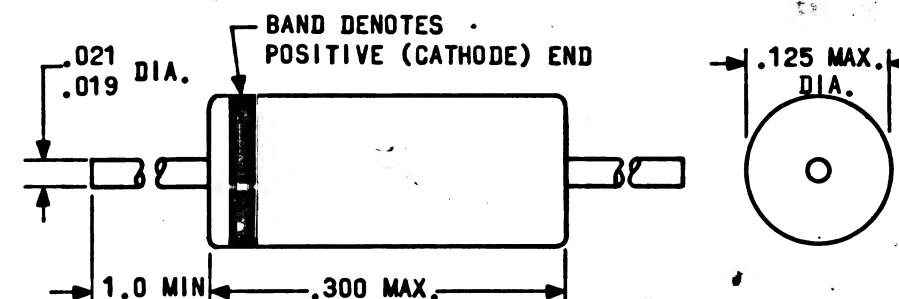
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

|         |         |
|---------|---------|
| F       | F       |
| E       | E       |
| D       | D       |
| C       | C       |
| SHEET 1 | SHEET 2 |

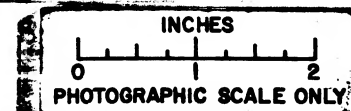
REVISION STATUS OF SHEETS

|             |         |   |
|-------------|---------|---|
|             |         | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>FRACTIONS DECIMALS ANGLES<br>$\pm$ $\pm$ $\pm$ |
|             |         | DO NOT SCALE THIS DRAWING   |
|             |         | MATERIAL  |
|             |         | SEE REQUIREMENTS  |
|             |         | HEAT TREATMENT<br>NONE  |
|             |         | FINAL FINISH<br>NONE  |
| NEXT ASSY   | USED ON |   |
| APPLICATION |         |   |



REPLACES REV(B) WITH CHANGE

|  |                                    |   |                             |
|--|------------------------------------|---|-----------------------------|
| QTY REQD   | PART OR IDENTIFYING NO.            | NOMENCLATURE OR DESCRIPTION   | FIND NO.                    |
|  |                                    | LIST OF MATERIALS   |                             |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE MASS<br>DWE NO. 9-487<br>DRAWN BY J.H. Patterson<br>CHECKED A.R. Tietz<br>APPROVAL A.R. Tietz 8/14/63 |                                    | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS<br>SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY)<br>SPECIFICATION CONTROL DRAWING |                             |
| NASA APPROVAL W.G. Rhee<br>8/14/63   | MIT APPROVAL W. G. Rhee<br>8/14/63 | CODE IDENT NO. SIZE<br>C 1010259  | NASA DRAWING NO.<br>1010259 |
| SCALE NONE WT  |                                    | SHEET 1 OF 2  |                             |





NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER. ADD THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY ANY PERSON OR CORPORATION, OR BY ANY INDIVIDUAL LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR BY ANY INDIVIDUAL, AS A BASIS FOR INFRINGEMENT OF PATENT RIGHTS OR FOR ANY OTHER RIGHTS OR FOR ANY OTHER PURPOSES.

F 6520101

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 8/14/63 | WK       |
| D         | REVISED PER TDRR 03390   | 9/26/63 | WK       |
| E         | REVISED PER TDRR 03969   | 1/28/63 | WK       |
| F         | REVISED PER TDRR 06691   |         | WK       |

4. SPECIAL CONDITIONING BY SUPPLIER:
- D A. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
- (1) AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$
  - (2) POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  AMBIENT TEMPERATURE RATING.
- B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
- (1) ZENER VOLTAGE
  - (2) ZENER IMPEDANCE
- C. BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT.
- D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.
- (1) PARAMETRIC CHANGE LIMITS:
- A. ZENER VOLTAGE:  $\pm .01\%$  OF INITIAL VALUE
  - B. ZENER IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

5. INSPECTION OF SEMICONDUCTORS: PER NO 1002220.
- A. A CERTIFICATE OF COMPLIANCE FOR THESE INSPECTION REQUIREMENTS SHALL BE INCLUDED WITH EACH SHIPMENT.

| TABLE I   |                       |   |  |
|---|-----------------------|---|--|
| MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE = $25^{\circ}\text{C}$ |                       |   |  |
| ZENER CURRENT (IZM)   | POWER DISSIPATION (P) | EIA TYPE DESIGNATION (FOR REFERENCE ONLY) |  |
| MA DC   | MW                    |   |  |
| 65  | 400                   | 1N825                                     |  |

| TABLE II  |                        |          |                      |        |                       |
|---|------------------------|----------|----------------------|--------|-----------------------|
| ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = $25^{\circ}\text{C}$ (UNLESS OTHERWISE SPECIFIED) |                        |          |                      |        |                       |
| PARAMETER   | CONDITIONS             | SYMBOL   | SPECIFICATION LIMITS |        |                       |
|   |                        |          | MIN                  | MAX    | UNITS                 |
| ZENER VOLTAGE   | $I_Z = 7.5 \text{ MA}$ | $V_Z$    | 6.15                 | 6.5    | VOLTS                 |
| ZENER IMPEDANCE   | $I_Z = 7.5 \text{ MA}$ | $Z_{ZT}$ | —                    | 15     | OHMS                  |
| TEMPERATURE COEFFICIENT   | $I_Z = 7.5 \text{ MA}$ | $T_C$    | -0.002               | +0.002 | %/ $^{\circ}\text{C}$ |

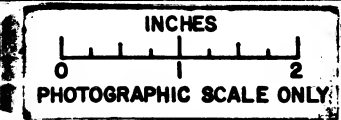
$T = -55^{\circ}\text{C}$  TO  $+100^{\circ}\text{C}$   
 $T_{REF} = +25^{\circ}\text{C}$

- NOTES:
1. ALL SPECIFICATIONS ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.
2. DYNAMIC IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL
- $Z_Z = \frac{E(AC)}{I(AC)}$
- MASTER

|             |         |   |
|-------------|---------|---|
|             |         | UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES |
|             |         | TOLERANCES ON                                       |
|             |         | FRACTIONS DECIMALS ANGLES                           |
|             |         | $\pm$ $\pm$ $\pm$                                   |
|             |         | DO NOT SCALE THIS DRAWING                           |
|             |         | MATERIAL  |
|             |         | HEAT TREATMENT                                      |
|             |         | FINAL FINISH  |
| NEXT ASSY   | USED ON |   |
| APPLICATION |         |   |

REPLACES REV(B) WITH CHANGE

|   |                         |  |                  |
|---|-------------------------|--|------------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.         |
| LIST OF MATERIALS   |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DWS NO. CONTRACT 9-497<br>DATE 29 JUL 63<br>DRAWN J.H. Peterson<br>CHECKED WILSON 1 AUG 63<br>APPROVAL A. A. Test 8/11/63<br>APPROVAL |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |                  |
| NASA APPROVAL W.D. Rhine 8-1-63<br>MIT APPROVAL W. J. J. 14 Aug 63  |                         | SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY) |                  |
| SPECIFICATION CONTROL DRAWING   |                         | CODE IDENT NO.   | NASA DRAWING NO. |
|   |                         | SIZE C   | 1010259          |
|   |                         | SCALE  | WT               |
|   |                         | SHEET 2 OF 2   |                  |



NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY FOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION OR CONFIRMING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

# REQUIREMENTS:

D

## 1. GENERAL:

- INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
- SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
- UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054. LIFE TEST CONDITIONS SHALL BE THE SAME AS BURN-IN CONDITIONS.
- PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH ND 1002129.

## 2. INSPECTION AND ACCEPTANCE:

### A. MECHANICAL REQUIREMENTS:

- LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
- MARKING: THE MANUFACTURER'S NAME, TRADEMARK OR CODE; NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER; AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.

C

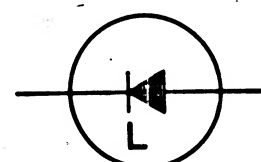
### B. ELECTRICAL SPECIFICATIONS: PER TABLE II

- ZENER VOLTAGE ( $V_Z$ )
- ZENER IMPEDANCE ( $Z_{ZT}$ )
- TEMPERATURE COEFFICIENT ( $T_{COEFF}$ )

## 3. DESIGN REQUIREMENTS:

- ELECTRICAL SPECIFICATIONS: PER TABLE II
- MAXIMUM RATINGS: PER TABLE I
- STORAGE AND JUNCTION TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$
- POWER DISSIPATION: 400 MILLIWATTS MAX
- THERMAL RESISTANCE: (JUNCTION TO AMBIENT AIR WITH CLIPS 1/2 INCH FROM BODY OF DIODE IN STILL FREE AIR):  $.313^{\circ}\text{C}/\text{MW}$  MAXIMUM.

B



GRAPHICAL SYMBOL

A

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

4

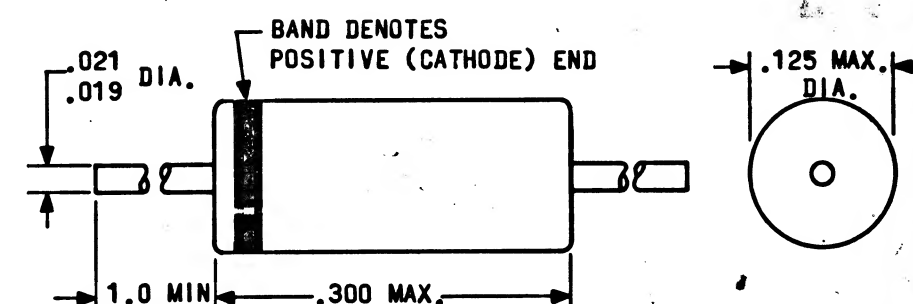
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| REVISIONS |  |           |          |
|-----------|--|-----------|----------|
| SYM       | DESCRIPTION  | DATE      | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 8/14/63   | WK       |
| D         | REVISED PER TDRR 03390   | 9/16/63   | JH       |
| E         | REVISED PER TDRR 03969   | 15 Oct 63 | WK       |
| F         | REVISED PER TDRR 06691   |           | WK       |
| G         | REVISED PER TDRR 08234   | 12 May 64 | WK       |

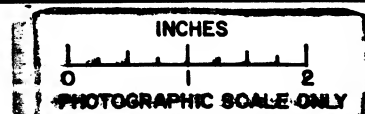


REPLACES REV(B) WITH CHANGE

|         |         |
|---------|---------|
| G       | G       |
| F       | F       |
| E       | E       |
| D       | D       |
| C       | C       |
| SHEET 1 | SHEET 2 |

REVISION STATUS OF SHEETS

|  |                         |   |   |
|--|-------------------------|---|---|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION   | FIND NO.  |
| LIST OF MATERIALS  |                         |   |   |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE MASS<br>DWS NO. CONTRACT 9-497<br>DRAWN BY H. Peterson DATE 29 JUL 63<br>CHECKED<br>APPROVAL A. R. Test 8/14/63<br>APPROVAL   |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS<br>SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY)<br>SPECIFICATION CONTROL DRAWING |   |
| UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>FRACTIONS DECIMALS ANGLES<br>± ± ±<br>DO NOT SCALE THIS DRAWING<br>MATERIAL<br>SEE REQUIREMENTS<br>HEAT TREATMENT<br>NONE<br>FINAL FINISH<br>NONE |                         | NASA APPROVAL W. J. R. 8/14/63<br>MIT APPROVAL W. J. R. 8/14/63   | CODE IDENT NO. SIZE<br>C 1010259<br>SCALE NONE WT<br>SHEET 1 OF 2 |
| NEXT ASSY  | USED ON                 | APPLICATION   |   |



NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

#### 4. SPECIAL CONDITIONING BY SUPPLIER:

##### A. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

- (1) AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$
- (2) POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  AMBIENT TEMPERATURE RATING.

##### B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

- (1) ZENER VOLTAGE
- (2) ZENER IMPEDANCE

##### C. BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT.

##### D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.

##### (1) PARAMETRIC CHANGE LIMITS:

A. ZENER VOLTAGE:  $\pm .01\%$  OF INITIAL VALUE

B. ZENER IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

TABLE I

MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE =  $25^{\circ}\text{C}$

| ZENER CURRENT (IZM) | POWER DISSIPATION (P) | EIA TYPE DESIGNATION (FOR REFERENCE ONLY) |
|---------------------|-----------------------|---|
| MA DC               | MW                    |   |
| 65                  | 400                   | 1N825                                     |

TABLE II

ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE =  $25^{\circ}\text{C}$  (UNLESS OTHERWISE SPECIFIED)

| PARAMETER               | CONDITIONS                | SYMBOL   | SPECIFICATION LIMITS |      |                       |
|-------------------------|---------------------------|----------|----------------------|------|-----------------------|
|                         |                           |          | MIN                  | MAX  | UNITS                 |
| ZENER VOLTAGE           | $I_{ZT} = 7.5 \text{ MA}$ | $V_Z$    | 6.15                 | 6.5  | VOLTS                 |
| ZENER IMPEDANCE         | $I_{ZT} = 7.5 \text{ MA}$ | $Z_{ZT}$ | —                    | 15   | OHMS                  |
| TEMPERATURE COEFFICIENT | $I_{ZT} = 7.5 \text{ MA}$ | $T_C$    | -0.004               | +0.0 | %/ $^{\circ}\text{C}$ |

$T = +25^{\circ}\text{C}$  TO  $+100^{\circ}\text{C}$   
 $T_{REF} = +25^{\circ}\text{C}$

#### NOTES:

1. ALL SPECIFICATIONS ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.
2. DYNAMIC IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL

$$Z_Z = \frac{E(AC)}{I(AC)}$$

NOTED

APPLICATION

#### 5. INSPECTION OF SEMICONDUCTORS: PER ND 1002220.

- A. A CERTIFICATE OF COMPLIANCE FOR THESE INSPECTION REQUIREMENTS SHALL BE INCLUDED WITH EACH SHIPMENT.

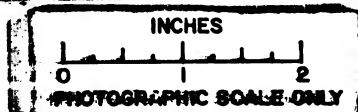
9 6520101

#### REVISIONS

| SYM | DESCRIPTION  | DATE     | APPROVAL |
|-----|--|----------|----------|
| C   | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 9/14/63  | WK       |
| D   | REVISED PER TDRR 03390   | 9/24/63  | WK       |
| E   | REVISED PER TDRR 03969   | 10/24/63 | WK       |
| F   | REVISED PER TDRR 06691   |          | WK       |
| G   | REVISED PER TDRR 08234   | 12/11/63 | WK       |

© REPLACES REV(B) WITH CHANGE

|   |                         |  |                  |
|---|-------------------------|--|------------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.         |
| LIST OF MATERIALS   |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>CONTRACT 9-497<br>DRAWN BY <u>J.H. Patterson</u> DATE <u>29 JUL 63</u><br>CHECKED <u>WILSON</u> 1 AUG 63<br>APPROVAL <u>B.A. Teat</u> 8/11/63 |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |                  |
| DO NOT SCALE THIS DRAWING MATERIAL  |                         | SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY) |                  |
| HEAT TREATMENT  |                         | SPECIFICATION CONTROL DRAWING  |                  |
| NASA APPROVAL <u>W.D. Rhine</u> 8-1-63  |                         | CODE IDENT NO.   | NASA DRAWING NO. |
| MIT APPROVAL <u>W.D. Rhine</u> 8/14/63  |                         | C  | 1010259          |
| SCALE   |                         | WT   | SHEET 2 OF 2     |





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#### REQUIREMENTS:

##### 1. GENERAL:

- INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
- SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
- UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054.
- PACKAGING AND PACKING: UNIT PACKAGING AND PACKING AND CONTAINER MARKING SHALL BE IN ACCORDANCE WITH ND1002215 CLASS I CODE 2.

##### 2. INSPECTION AND ACCEPTANCE:

###### A. MECHANICAL REQUIREMENTS:

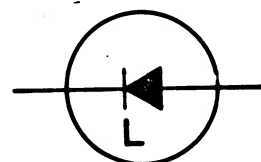
- LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
- MARKING: THE MANUFACTURER'S NAME, TRADEMARK OR CODE; NASA DRAWING NUMBER, (WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS), DASH NUMBER, AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.

###### B. ELECTRICAL SPECIFICATIONS: PER TABLE II

- ZENER VOLTAGE ( $V_Z$ )
- ZENER IMPEDANCE ( $Z_{ZT}$ )
- TEMPERATURE COEFFICIENT ( $T_{COEFF}$ )

##### 3. DESIGN REQUIREMENTS:

- ELECTRICAL SPECIFICATIONS: PER TABLE II
- MAXIMUM RATINGS: PER TABLE I
- STORAGE AND JUNCTION TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$
- POWER DISSIPATION: 400 MILLIWATTS MAX
- THERMAL RESISTANCE: (JUNCTION TO AMBIENT AIR WITH CLIPS 1/2 INCH FROM BODY OF DIODE IN STILL FREE AIR):  $.313^{\circ}\text{C}/\text{MW}$  MAXIMUM.

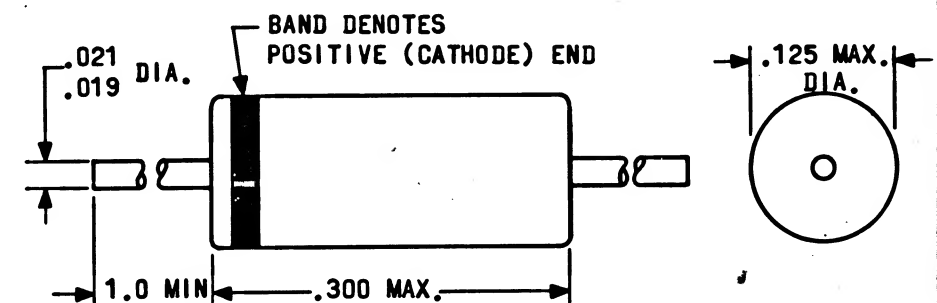


GRAPHICAL SYMBOL

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

H 6520101

| REVISIONS |  |           |          |
|-----------|--|-----------|----------|
| SYM       | DESCRIPTION  | DATE      | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 8/14/63   | WK       |
| D         | REVISED PER TDRR 03390   | 7/26/63   | JH       |
| E         | REVISED PER TDRR 03969   | 15 Oct 63 | WK       |
| F         | REVISED PER TDRR 06691   |           | WK       |
| G         | REVISED PER TDRR 08234   | 12/19/64  | WK       |
| H         | REVISED PER TDRR 19915   | 6/18/65   | WK       |



REPLACES REV(B) WITH CHANGE

|  |                         |  |              |
|--|-------------------------|--|--------------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.     |
| LIST OF MATERIALS  |                         |  |              |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE MASS<br>DWC NO. CONTRACT 9-497<br>DRAWN BY H. Peterson DATE 20 JUL 63 |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |              |
| CHECKED BY G. R. Test DATE 9/14/63   |                         | SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY) |              |
| APPROVAL   |                         | SPECIFICATION CONTROL DRAWING  |              |
| NASA APPROVAL W. J. Rhine<br>DATE 8-14-63  |                         | CODE IDENT NO. 30230   | SIZE C       |
| MIT APPROVAL W. J. Rhine<br>DATE 8-14-63   |                         | NASA DRAWING NO. 1010259   |              |
| SCALE NONE   |                         | WT   | SHEET 1 OF 2 |

|   |          |             |
|---|----------|-------------|
| UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON |          |             |
| FRACTIONS   | DECIMALS | ANGLES      |
| ±   | ±        | ±           |
| DO NOT SCALE THIS DRAWING   |          |             |
| MATERIAL  |          |             |
| SEE REQUIREMENTS  |          |             |
| HEAT TREATMENT  |          |             |
| NONE  |          |             |
| FINAL FINISH  |          |             |
| NONE  |          |             |
| NEXT ASSY   | USED ON  | APPLICATION |



|       |    |              |
|-------|----|--------------|
| SCALE | WT | SHEET 2 OF 2 |
|-------|----|--------------|

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONFERRING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERE TO.

#### REQUIREMENTS:

##### 1. GENERAL:

- INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
- SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
- UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054.
- PACKAGING AND PACKING: UNIT PACKAGING AND PACKING AND CONTAINER MARKING SHALL BE IN ACCORDANCE WITH ND1002215 CLASS I CODE 2.

##### 2. INSPECTION AND ACCEPTANCE:

###### A. MECHANICAL REQUIREMENTS:

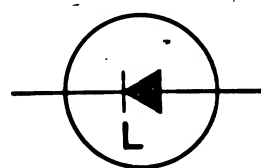
- LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
- MARKING: THE MANUFACTURER'S NAME, TRADEMARK OR CODE; NASA DRAWING NUMBER, (WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS), DASH NUMBER, AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.

###### B. ELECTRICAL SPECIFICATIONS: PER TABLE II

- ZENER VOLTAGE ( $V_Z$ )
- ZENER IMPEDANCE ( $Z_{ZT}$ )
- TEMPERATURE COEFFICIENT ( $T_{COEFF}$ )

##### 3. DESIGN REQUIREMENTS:

- ELECTRICAL SPECIFICATIONS: PER TABLE II
- MAXIMUM RATINGS: PER TABLE I
- STORAGE AND JUNCTION TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$
- POWER DISSIPATION: 400 MILLIWATTS MAX
- THERMAL RESISTANCE: (JUNCTION TO AMBIENT AIR WITH CLIPS 1/2 INCH FROM BODY OF DIODE IN STILL FREE AIR):  $.313^{\circ}\text{C}/\text{MW}$  MAXIMUM.

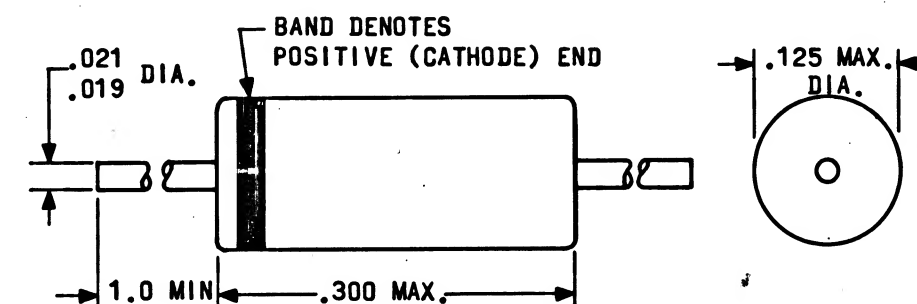


GRAPHICAL SYMBOL

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

6920101

| REVISIONS |  |           |          |
|-----------|--|-----------|----------|
| SYM       | DESCRIPTION  | DATE      | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 8/14/63   | WK       |
| D         | REVISED PER TDRR 03390   | 9/21/63   | JH       |
| E         | REVISED PER TDRR 03969   | 15 Oct 63 | WK       |
| F         | REVISED PER TDRR 06691   |           | WK       |
| G         | REVISED PER TDRR 08234   | 12/1/64   | WK       |
| H         | REVISED PER TDRR 19915   | 6/15/65   | WK       |
| J         | REVISED PER TDRR 21627   | 8/31/65   | WK       |



REPLACES REV(B) WITH CHANGE

|   |                         |   |  |
|---|-------------------------|---|--|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION   | FIND NO.                                 |
| LIST OF MATERIALS   |                         |   |  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE MASS<br>CONTRACT NAS 9-497<br>DWG NO. 69-1463<br>DATE 29 JUL 63<br>DRAWN BY H. Peterson<br>CHECKED BY J. R. Test<br>APPROVAL BY J. R. Test 8/14/63 |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS<br>SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY)<br>SPECIFICATION CONTROL DRAWING |  |
| NASA APPROVAL BY W. J. Rhoads<br>DATE 8-14-63<br>MIT APPROVAL BY W. J. Rhoads<br>DATE 8-14-63   |                         | CODE IDENT NO. 80230<br>SIZE C<br>SCALE NONE<br>WT  | NASA DRAWING NO. 1010259<br>SHEET 1 OF 2 |

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY FOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION OR CONFERRING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

#### 4. SPECIAL CONDITIONING BY SUPPLIER:

- D. A. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
- (1) AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$
  - (2) POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  AMBIENT TEMPERATURE RATING.
- B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
- (1) ZENER VOLTAGE
  - (2) ZENER IMPEDANCE
- C. BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT.
- D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.
- (1) PARAMETRIC CHANGE LIMITS:
- A. ZENER VOLTAGE:  $\pm .01\%$  OF INITIAL VALUE
  - B. ZENER IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

| TABLE I<br>MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE = $25^{\circ}\text{C}$ |                     |                       |   |
|--|---------------------|-----------------------|---|
| DASH NO.   | ZENER CURRENT (IZM) | POWER DISSIPATION (P) | EIA TYPE DESIGNATION (FOR REFERENCE ONLY) |
| -000   | MA DC               | MW                    |   |
| -001   | 65                  | 400                   | 1N825                                     |
| -002   | 65                  | 400                   | 1N825                                     |

#### 5. INSPECTION OF SEMICONDUCTORS: PER ND 1002220.

- A. A CERTIFICATE OF COMPLIANCE FOR THESE INSPECTION REQUIREMENTS SHALL BE INCLUDED WITH EACH SHIPMENT.

| TABLE II<br>ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE $25^{\circ}\text{C}$<br>(UNLESS OTHERWISE SPECIFIED) |  |   |          |                      |        |                       |
|--|--|---|----------|----------------------|--------|-----------------------|
| DASH NO.   | PARAMETER  | CONDITIONS  | SYMBOL   | SPECIFICATION LIMITS |        |                       |
|  |  |   |          | MIN                  | MAX    | UNITS                 |
| -000   | ZENER VOLTAGE  | $I_{ZT} = 7.5 \text{ MA}$   | $V_Z$    | 6.15                 | 6.5    | VOLTS                 |
|  | ZENER IMPEDANCE  | $I_{ZT} = 7.5 \text{ MA}$   | $Z_{ZT}$ | -                    | 15     | OHMS                  |
|  | TEMPERATURE COEFFICIENT  | $I_{ZT} = 7.5 \text{ MA}$<br>$T = +25^{\circ}\text{C TO } +100^{\circ}\text{C}$<br>$T_{\text{REF}} = +25^{\circ}\text{C}$ | $T_C$    | -.004                | +0     | %/ $^{\circ}\text{C}$ |
|  |  |   |          |                      |        |                       |
| -001   | ZENER VOLTAGE  | $I_{ZT} = 7.5 \text{ MA}$   | $V_Z$    | 5.9                  | 6.5    | VOLTS                 |
|  | ZENER IMPEDANCE  | $I_{ZT} = 7.5 \text{ MA}$   | $Z_{ZT}$ |                      | 10     | OHMS                  |
|  |  | $I_{ZK} = 1 \text{ MA}$   | $Z_{ZK}$ |                      | 150    | OHMS                  |
|  | TEMPERATURE COEFFICIENT  | $I_{ZT} = 7.5 \text{ MA}$<br>$T = +25^{\circ}\text{C TO } +100^{\circ}\text{C}$<br>$T_{\text{REF}} = +25^{\circ}\text{C}$ | $T_C$    | -.002                | +0.002 | %/ $^{\circ}\text{C}$ |
|  | LEAKAGE CURRENT  | $V_Z = 5.0 \text{ VOLTS}$   | $I_{R1}$ |                      | 100    | $\mu\text{A}$         |
|  |  | $V_Z = 3.0 \text{ VOLTS}$<br>AT $+100^{\circ}\text{C}$  | $I_{R2}$ |                      | 100    | $\mu\text{A}$         |
| -002   | SAME AS -001 EXCEPT TEMPERATURE COEFFICIENT CONDITION $T = -55^{\circ}\text{C TO } +100^{\circ}\text{C}$ |   |          |                      |        |                       |

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 8/14/63 | WK       |
| D         | REVISED PER TDRR 03390   | 7/26/63 | WK       |
| E         | REVISED PER TDRR 03969   | 1/28/63 | WK       |
| F         | REVISED PER TDRR 06691   |         | WK       |
| G         | REVISED PER TDRR 08234   | 12/4/64 | WK       |
| H         | REVISED PER TDRR 19915   | 6/18/65 | WK       |
| J         | REVISED PER TDRR 21627   | 8/13/65 | WK       |

#### NOTES:

1. ALL SPECIFICATIONS ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.
2. DYNAMIC IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL

$$Z_z = \frac{E(AC)}{I(AC)}$$

|             |         |   |
|-------------|---------|---|
|             |         | UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES |
|             |         | $\pm$ $\pm$ $\pm$   |
|             |         | DO NOT SCALE THIS DRAWING   |
|             |         | MATERIAL  |
|             |         | HEAT TREATMENT  |
|             |         | FINAL FINISH  |
| NEXT ASSY   | USED ON |   |
| APPLICATION |         |   |

REPLACES REV(B) WITH CHANGE

|  |                         |  |          |
|--|-------------------------|--|----------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO. |
| LIST OF MATERIALS  |                         |  |          |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>CONTRACT 9-497 |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |          |
| DRAWN BY J.H. Patterson DATE 29 JUL 63                       |                         | SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY) |          |
| CHECKED WILSON 1 AUG 63                                      |                         | SPECIFICATION CONTROL DRAWING  |          |
| APPROVAL A.A. Test 8/14/63                                   |                         | CODE IDENT NO. SIZE<br>80230 C   |          |
| NASA APPROVAL W.D. Rhine 8-14-63                             |                         | NASA DRAWING NO.<br>1010259  |          |
| MIT APPROVAL W. J. for 14 Aug 63                             |                         | SCALE  | WT       |
|  |                         | SHEET 2 OF 2   |          |

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# REQUIREMENTS:

D

## 1. GENERAL:

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.

C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054.

D. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING AND CONTAINER MARKING SHALL BE IN ACCORDANCE WITH ND1002215 CLASS I CODE 2.

## 2. INSPECTION AND ACCEPTANCE:

### A. MECHANICAL REQUIREMENTS:

(1) LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

(2) MARKING: THE MANUFACTURER'S NAME, TRADEMARK OR CODE; NASA DRAWING NUMBER, (WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS), DASH NUMBER, AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.

### B. ELECTRICAL SPECIFICATIONS: PER TABLE II

(1) ZENER VOLTAGE ( $V_Z$ )

(2) ZENER IMPEDANCE ( $Z_{ZT}$ )

(3) TEMPERATURE COEFFICIENT ( $T_{COEFF}$ )

## 3. DESIGN REQUIREMENTS:

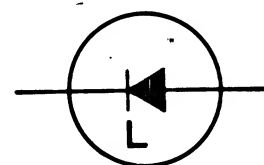
A. ELECTRICAL SPECIFICATIONS: PER TABLE II

B. MAXIMUM RATINGS: PER TABLE I

C. STORAGE AND JUNCTION TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$

D. POWER DISSIPATION: 400 MILLIWATTS MAX

E. THERMAL RESISTANCE: (JUNCTION TO AMBIENT AIR WITH CLIPS  $1/2$  INCH FROM BODY OF DIODE IN STILL FREE AIR):  $.313^{\circ}\text{C}/\text{MW}$  MAXIMUM.



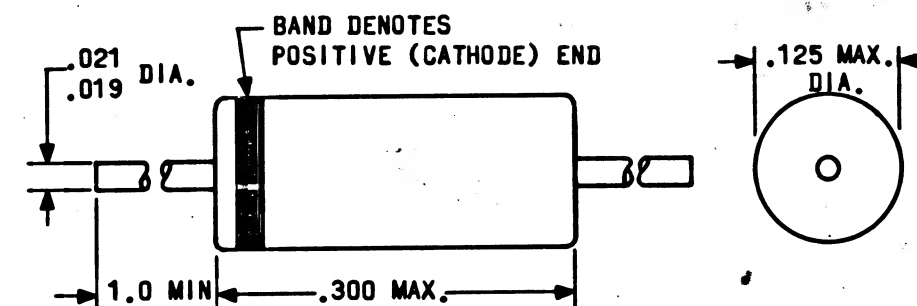
GRAPHICAL SYMBOL

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

K 6520101

| REVISIONS |  |           |          |
|-----------|--|-----------|----------|
| SYM       | DESCRIPTION  | DATE      | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 8/14/63   | WK       |
| D         | REVISED PER TDRR 03390   | 9/21/63   | JW       |
| E         | REVISED PER TDRR 03969   | 15 Oct 63 | WK       |
| F         | REVISED PER TDRR 06691   |           | WK       |
| G         | REVISED PER TDRR 08234   | 12 May 64 | WK       |
| H         | REVISED PER TDRR 19915   | 6/18/65   | WK       |
| J         | REVISED PER TDRR 21627   | 8/3/65    | WK       |
| K         | REVISED PER TDRR 25352   | 11/3/66   | WK       |



REPLACES REV(B) WITH CHANGE

|  |                         |  |                          |
|--|-------------------------|--|--------------------------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.                 |
| LIST OF MATERIALS  |                         |  |                          |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE MASS<br>DWC NO. CONTRACT 9-497<br>DRAWN BY H. Peterson DATE 29 JUL 63 |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |                          |
| CHECKED BY A. R. Test 9/14/63<br>APPROVAL  |                         | SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY) |                          |
| NASA APPROVAL W. J. Rhine<br>DATE 8-14-63  |                         | CODE IDENT NO. 80230   | NASA DRAWING NO. 1010259 |
| MIT APPROVAL W. J. Rhine<br>DATE 8-14-63   |                         | SCALE NONE   | WT                       |
| SHEET 1 OF 2   |                         |  |                          |



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#### 4. SPECIAL CONDITIONING BY SUPPLIER:

##### A. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

- (1) AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$
- (2) POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  AMBIENT TEMPERATURE RATING.

##### B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

- (1) ZENER VOLTAGE
- (2) ZENER IMPEDANCE

##### C. BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT.

##### D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.

##### (1) PARAMETRIC CHANGE LIMITS:

A. ZENER VOLTAGE:  $\pm .01\%$  OF INITIAL VALUE

B. ZENER IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

| TABLE I<br>MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE = $25^{\circ}\text{C}$ |                     |                       |   |
|--|---------------------|-----------------------|---|
| DASH NO.   | ZENER CURRENT (IZM) | POWER DISSIPATION (P) | EIA TYPE DESIGNATION (FOR REFERENCE ONLY) |
|  | MA DC               | MW                    |   |
| -000   | 65                  | 400                   | 1N825                                     |
| -001   | 65                  | 400                   | 1N825                                     |
| -002   | 65                  | 400                   | 1N825                                     |

#### 5. INSPECTION OF SEMICONDUCTORS: PER ND 1002220.

##### A. A CERTIFICATE OF COMPLIANCE FOR THESE INSPECTION REQUIREMENTS SHALL BE INCLUDED WITH EACH SHIPMENT.

| TABLE II<br>ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE $25^{\circ}\text{C}$<br>(UNLESS OTHERWISE SPECIFIED) |  |   |          |       |       |       |
|--|--|---|----------|-------|-------|-------|
| DASH NO.   | PARAMETER  | CONDITIONS  | SYMBOL   | MIN   | MAX   | UNITS |
| -000   | ZENER VOLTAGE  | $I_{ZT} = 7.5 \text{ MA}$   | $V_Z$    | 6.15  | 6.5   | VOLTS |
|  | ZENER IMPEDANCE  | $I_{ZT} = 7.5 \text{ MA}$   | $Z_{ZT}$ | -     | 15    | OHMS  |
|  | TEMPERATURE COEFFICIENT  | $I_{ZT} = 7.5 \text{ MA}$<br>$T = +25^{\circ}\text{C TO } +100^{\circ}\text{C}$<br>$T_{\text{REF}} = +25^{\circ}\text{C}$ | $T_C$    | -.004 | +.0   | %/°C  |
| -001   | ZENER VOLTAGE  | $I_{ZT} = 7.5 \text{ MA}$   | $V_Z$    | 5.9   | 6.5   | VOLTS |
|  | ZENER IMPEDANCE  | $I_{ZT} = 7.5 \text{ MA}$   | $Z_{ZT}$ |       | 10    | OHMS  |
|  |  | $I_{ZK} = 1 \text{ MA}$   | $Z_{ZK}$ |       | 150   | OHMS  |
|  | TEMPERATURE COEFFICIENT  | $I_{ZT} = 7.5 \text{ MA}$<br>$T = +25^{\circ}\text{C TO } +100^{\circ}\text{C}$<br>$T_{\text{REF}} = +25^{\circ}\text{C}$ | $T_C$    | -.002 | +.002 | %/°C  |
|  | LEAKAGE CURRENT  | $V_Z = 5.0 \text{ VOLTS}$   | $I_{R1}$ |       | 100   | uA    |
|  |  | $V_Z = 3.0 \text{ VOLTS}$<br>AT $+100^{\circ}\text{C}$  | $I_{R2}$ |       | 100   | uA    |
| -002   | SAME AS -001 EXCEPT TEMPERATURE COEFFICIENT CONDITION $T = -55^{\circ}\text{C TO } +100^{\circ}\text{C}$ |   |          |       |       |       |

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 8/14/63 | WK       |
| D         | REVISED PER TDRR 03390   | 9/24/63 | WK       |
| E         | REVISED PER TDRR 03969   | 1/28/63 | WK       |
| F         | REVISED PER TDRR 06691   |         | WK       |
| G         | REVISED PER TDRR 08234   | 12/4/64 | WK       |
| H         | REVISED PER TDRR 19915   | 6/18/65 | WK       |
| J         | REVISED PER TDRR 21627   | 8/31/65 | WK       |
| K         | REVISED PER TDRR 25352   | 2/8/66  | WK       |

#### NOTES:

1. ALL SPECIFICATIONS ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.
2. DYNAMIC IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL

$$Z_Z = \frac{E(AC)}{I(AC)}$$

|             |         |   |
|-------------|---------|---|
|             |         | UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES |
|             |         | DO NOT SCALE THIS DRAWING MATERIAL  |
|             |         | HEAT TREATMENT  |
|             |         | FINAL FINISH  |
| NEXT ASSY   | USED ON |   |
| APPLICATION |         |   |

©REPLACES REV(B) WITH CHANGE

|  |                         |  |           |
|--|-------------------------|--|-----------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.  |
| LIST OF MATERIALS  |                         |  |           |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.<br>DWG. NO. 9-497<br>CONTRACT 9-497<br>DRAWN BY J.H. Peterson<br>DATE 29 JUL 63<br>CHECKED BY WILSON<br>DATE 1 AUG 63<br>APPROVAL BY A.A. Test<br>DATE 8/11/63 |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS<br><br>SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY) |           |
| NASA APPROVAL<br>DATE 10-1-63<br>MIT APPROVAL<br>DATE 10/1/63  |                         | CODE IDENT NO.<br>80230  | SIZE<br>C |
|  |                         | SCALE  | WT        |
|  |                         | SHEET 2 OF 2   |           |

1010259

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#### REQUIREMENTS:

##### 1. GENERAL:

- INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
- SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
- UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054.
- PACKAGING AND PACKING: UNIT PACKAGING AND PACKING AND CONTAINER MARKING SHALL BE IN ACCORDANCE WITH ND1002215 CLASS I CODE 2.

##### 2. INSPECTION AND ACCEPTANCE:

###### A. MECHANICAL REQUIREMENTS:

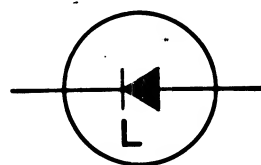
- LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
- MARKING: THE MANUFACTURER'S NAME, TRADEMARK OR CODE; NASA DRAWING NUMBER, (WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS), DASH NUMBER, AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.

###### B. ELECTRICAL SPECIFICATIONS: PER TABLE II

- ZENER VOLTAGE ( $V_Z$ )
- ZENER IMPEDANCE ( $Z_{T}$ )
- TEMPERATURE COEFFICIENT ( $T_{COEFF}$ )

##### 3. DESIGN REQUIREMENTS:

- ELECTRICAL SPECIFICATIONS: PER TABLE II
- MAXIMUM RATINGS: PER TABLE I
- STORAGE AND JUNCTION TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$
- POWER DISSIPATION: 400 MILLIWATTS MAX
- THERMAL RESISTANCE: (JUNCTION TO AMBIENT AIR WITH CLIPS  $1/2$  INCH FROM BODY OF DIODE IN STILL FREE AIR):  $.313^{\circ}\text{C}/\text{MW}$  MAXIMUM.



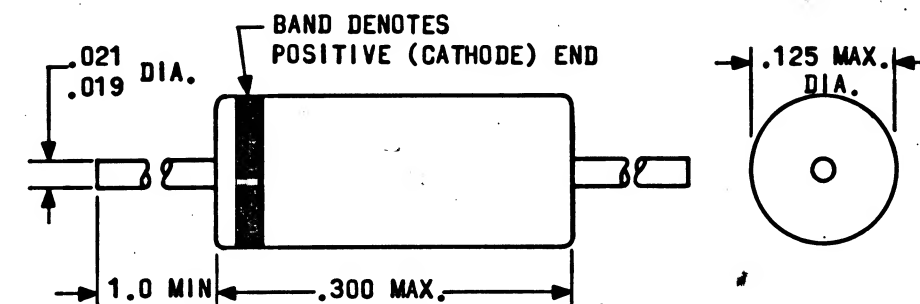
GRAPHICAL SYMBOL

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

7 6520101

| REVISIONS |  |           |          |
|-----------|--|-----------|----------|
| SYM       | DESCRIPTION  | DATE      | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 8/14/63   | WK       |
| D         | REVISED PER TDRR 03390   | 9/26/63   | SN       |
| E         | REVISED PER TDRR 03969   | 15 Oct 63 | WK       |
| F         | REVISED PER TDRR 06691   |           | PPK WK   |
| G         | REVISED PER TDRR 08234   | 12/24/64  | WK       |
| H         | REVISED PER TDRR 19915   | 6/18/65   | WK       |
| J         | REVISED PER TDRR 21627   | 8/31/65   | WK       |
| K         | REVISED PER TDRR 25352   | 12/14/66  | WK       |
| L         | REVISED PER TDRR 29261   | 6/2/66    | WJ       |



REPLACES REV(B) WITH CHANGE

|   |                         |  |                          |
|---|-------------------------|--|--------------------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.                 |
| LIST OF MATERIALS   |                         |  |                          |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE MASS<br>DWG. NO. CONTRACT 9-497<br>DRAWN BY H. Peterson DATE 29 JUL 63 |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |                          |
| CHECKED BY J. R. Felt DATE 9/14/63  |                         | SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY) |                          |
| APPROVAL BY W. J. Rhoads DATE 8-17-63   |                         | SPECIFICATION CONTROL DRAWING  |                          |
| NASA APPROVAL BY W. J. Rhoads DATE 8-17-63  |                         | CODE IDENT NO. 80230   | NASA DRAWING NO. 1010259 |
| MIT APPROVAL BY W. J. Rhoads DATE 8-17-63   |                         | SCALE NONE   | WT                       |
| APPLICATION   |                         | SHEET 1 OF 2   |                          |

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#### 4. SPECIAL CONDITIONING BY SUPPLIER:

- D A. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
- (1) AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$
  - (2) POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  AMBIENT TEMPERATURE RATING.
- B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
- (1) ZENER VOLTAGE
  - (2) ZENER IMPEDANCE
- C. BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT.
- D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.
- (1) PARAMETRIC CHANGE LIMITS:
- A. ZENER VOLTAGE:  $\pm .01\%$  OF INITIAL VALUE
  - B. ZENER IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

| TABLE I<br>MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE = $25^{\circ}\text{C}$ |                     |                       |   |
|--|---------------------|-----------------------|---|
| DASH NO.   | ZENER CURRENT (IZM) | POWER DISSIPATION (P) | EIA TYPE DESIGNATION (FOR REFERENCE ONLY) |
|  | MA DC               | MW                    |   |
| -000   | 65                  | 400                   | 1N825                                     |
| -001   | 65                  | 400                   | 1N825                                     |
| -002   | 65                  | 400                   | 1N825                                     |

#### 5. INSPECTION OF SEMICONDUCTORS: PER NO 1002220.

- A. A CERTIFICATE OF COMPLIANCE FOR THESE INSPECTION REQUIREMENTS SHALL BE INCLUDED WITH EACH SHIPMENT.

| TABLE II<br>ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE $25^{\circ}\text{C}$<br>(UNLESS OTHERWISE SPECIFIED) |  |   |          |                      |        |                       |
|--|--|---|----------|----------------------|--------|-----------------------|
| DASH NO.   | PARAMETER  | CONDITIONS  | SYMBOL   | SPECIFICATION LIMITS |        |                       |
|  |  |   |          | MIN                  | MAX    | UNITS                 |
| -000   | ZENER VOLTAGE  | $I_{ZT} = 7.5 \text{ MA}$   | $V_Z$    | 6.15                 | 6.5    | VOLTS                 |
|  | ZENER IMPEDANCE  | $I_{ZT} = 7.5 \text{ MA}$   | $Z_{ZT}$ | -                    | 15     | OHMS                  |
|  | TEMPERATURE COEFFICIENT  | $I_{ZT} = 7.5 \text{ MA}$<br>$T = +25^{\circ}\text{C TO } +100^{\circ}\text{C}$<br>$T_{\text{REF}} = +25^{\circ}\text{C}$ | $T_C$    | -0.004               | +0     | $\%/^{\circ}\text{C}$ |
| -001   | ZENER VOLTAGE  | $I_{ZT} = 7.5 \text{ MA}$   | $V_Z$    | 5.9                  | 6.5    | VOLTS                 |
|  | ZENER IMPEDANCE  | $I_{ZT} = 7.5 \text{ MA}$   | $Z_{ZT}$ |                      | 10     | OHMS                  |
|  |  | $I_{ZK} = 1 \text{ MA}$   | $Z_{ZK}$ |                      | 150    | OHMS                  |
|  | TEMPERATURE COEFFICIENT  | $I_{ZT} = 7.5 \text{ MA}$<br>$T = +25^{\circ}\text{C TO } +100^{\circ}\text{C}$<br>$T_{\text{REF}} = +25^{\circ}\text{C}$ | $T_C$    | -0.002               | +0.002 | $\%/^{\circ}\text{C}$ |
|  | LEAKAGE CURRENT  | $V_Z = 5.0 \text{ VOLTS}$   | $I_{R1}$ |                      | 100    | $\mu\text{A}$         |
| -002   |  | $V_Z = 3.0 \text{ VOLTS}$<br>AT $+100^{\circ}\text{C}$  | $I_{R2}$ |                      | 100    | $\mu\text{A}$         |
|  | SAME AS -001 EXCEPT TEMPERATURE COEFFICIENT CONDITION $T = -55^{\circ}\text{C TO } +100^{\circ}\text{C}$ |   |          |                      |        |                       |
| -003   | SAME AS -002 EXCEPT ZENER VOLTAGE SHALL BE $6.2 \pm 1\%$ AT 7.5 MA                                       |   |          |                      |        |                       |

| REVISIONS |  |          |          |
|-----------|--|----------|----------|
| SYM       | DESCRIPTION  | DATE     | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02605 | 8/14/63  | WK       |
| D         | REVISED PER TDRR 03390   | 9/26/63  | WK       |
| E         | REVISED PER TDRR 03969   | 10/26/63 | WK       |
| F         | REVISED PER TDRR 06691   |          | WK       |
| G         | REVISED PER TDRR 08234   | 12/4/64  | WK       |
| H         | REVISED PER TDRR 19915   | 6/18/65  | WK       |
| J         | REVISED PER TDRR 21627   | 8/13/65  | WK       |
| K         | REVISED PER TDRR 25352   | 2/8/66   | WK       |
| L         | REVISED PER TDRR 29261   | 4/13/66  | WK       |

#### NOTES:

1. ALL SPECIFICATIONS ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.
2. DYNAMIC IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL

$$(Z_Z = \frac{E(AC)}{I(AC)})$$

MASTER

|             |         |   |  |
|-------------|---------|---|--|
|             |         | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>FRACTIONS DECIMALS ANGLES<br>$\pm \quad \pm \quad \pm$ |  |
|             |         | DO NOT SCALE THIS DRAWING   |  |
|             |         | MATERIAL  |  |
|             |         | HEAT TREATMENT  |  |
| NEXT ASSY   | USED ON | FINAL FINISH  |  |
| APPLICATION |         |   |  |

©REPLACES REV(B) WITH CHANGE

|   |                         |  |          |
|---|-------------------------|--|----------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO. |
| LIST OF MATERIALS   |                         |  |          |
| MIT<br>INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>CONTRACT 9-497<br>DWN'D BY J.H. Peterson DATE 29 JUL 63<br>CHECKED WILSON 1 AUG 63<br>APPROVAL A.R. Test 8/14/63<br>APPROVAL |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |          |
| NASA APPROVAL W.J. Rhine 8-1-63<br>MIT APPROVAL W. J. Rhine 8/14/63   |                         | SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REFERENCE, SILICON,<br>AXIAL LEAD, GLASS BODY) |          |
| CODE IDENT NO.<br>80230   |                         | SPECIFICATION CONTROL DRAWING<br>SIZE<br>C   |          |
| SCALE   |                         | NASA DRAWING NO.<br>1010259  |          |
| WT  |                         | SHEET 2 OF 2   |          |

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#### REQUIREMENTS:

##### GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER NASA DOCUMENT 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

ELECTRICAL CHARACTERISTICS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

TEMPERATURE COEFFICIENT ( $T_{COEFF}$ )

MARKING: THE MANUFACTURER'S NAME, TRADEMARK, OR CODE: TYPE DESIGNATION, DATE CODE, LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART.

##### GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$

ELECTRICAL RATING: PER TABLE I

ELECTRICAL SPECIFICATION: PER TABLE II

POWER DISSIPATION: 250 MILLIWATTS MAX

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002054.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER NASA DOCUMENT 1015404, CLASS I.

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491 LEVEL A IN BOTH INSTANCES.

(1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

##### GROUP III (SPECIAL CONDITIONING BY SUPPLIER):

BURN IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

1. AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$

2. POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  CASE TEMPERATURE RATING.

DIODES WHICH FAIL TO MEET ALL INITIAL MEASUREMENTS AND THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN IN SHALL NOT BE ACCEPTABLE.

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN IN:

1. ZENER VOLTAGE ( $V_Z$ )

2. DYNAMIC IMPEDANCE ( $Z_{ZT}$ )

PARAMETRIC CHANGE LIMITS:

1. ZENER VOLTAGE:  $\pm 1\%$  OF INITIAL VALUE

2. ZENER IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

#### PROCUREMENT NOTE:

A WAIVE-AS REQUIRED ALL INFORMATION PRESENTED ON THIS DRAWING EXCEPT LEAD MATERIAL SPECIFICATION AND PHYSICAL DIMENSIONS

B UPON SPECIFIC INSTRUCTION BY TECHNICAL DIRECTIVE (TD) PROCURE THIS PART AS CHANGE SYMBOL BY-ORDERING TO VENDOR CATALOGUE NUMBER & SPECIFICATION, REFERENCE ND 1002034

C DISREGARD THIS NOTE IN ITS ENTIRETY IF REFERENCE IS MADE TO THIS DRAWING BY OTHER THAN REVISION SYMBOL (—)

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

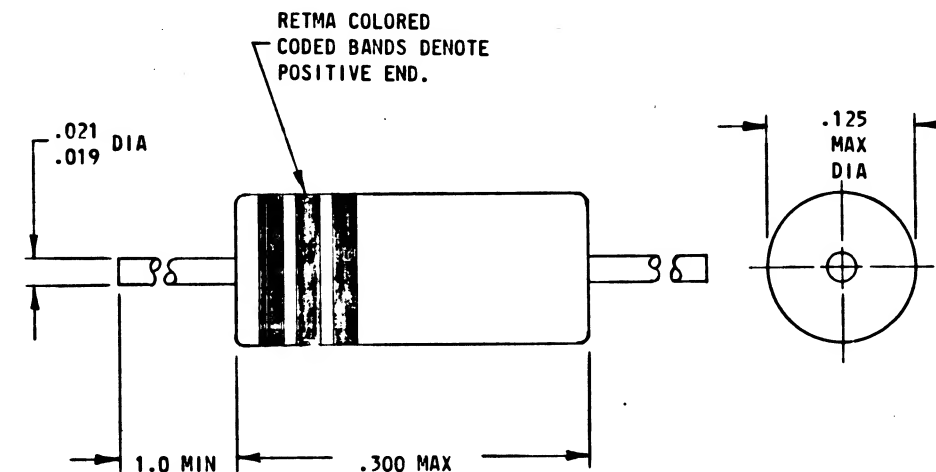
1010259

#### REVISIONS

| SYM | DESCRIPTION          | DATE | APPROVAL |
|-----|----------------------|------|----------|
| —   | SEE PROCUREMENT NOTE |      |          |

## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63



|                           |         |
|---------------------------|---------|
| —                         | —       |
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

|             |         |   |
|-------------|---------|---|
|             |         | UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON |
|             |         | FRACTIONS DECIMALS ANGLES   |
|             |         | $\pm$ $\pm$ $\pm$   |
|             |         | DO NOT SCALE THIS DRAWING   |
|             |         | MATERIAL  |
|             |         | SEE NOTES   |
|             |         | HEAT TREATMENT  |
|             |         | NONE  |
|             |         | FINAL FINISH  |
|             |         | NONE  |
| NEXT ASSY   | USED ON |   |
| APPLICATION |         |   |

|   |                         |  |                  |
|---|-------------------------|--|------------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                                  | FIND NO.         |
| LIST OF MATERIALS   |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.<br>CONTRACT   |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                   |                  |
| DRAWN <i>Ray</i> DATE <i>2/20/63</i><br>CHECKED <i>J.S. Pabst</i> 3/9/63<br>APPROVAL <i>R.J. Beaton</i><br>APPROVAL |                         | SEMICONDUCTOR DEVICE, DIODE<br>SPECIFICATION CONTROL DRAWING |                  |
| NASA APPROVAL <i>Jack Bernard</i> 2/20/63<br>MIT APPROVAL <i>W. J. Pabst</i> 2/20/63                                |                         | CODE IDENT NO.   | NASA DRAWING NO. |
|   |                         | SIZE C   | 1010259          |
|   |                         | SCALE NONE   | WT               |
|   |                         | SHEET 1 OF 2   |                  |



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1010259

| REVISIONS |                      |      |          |
|-----------|----------------------|------|----------|
| SYM       | DESCRIPTION          | DATE | APPROVAL |
| —         | SEE PROCUREMENT NOTE |      |          |

TABLE I

| MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE = 25°C |                       |   |                                      |
|---|-----------------------|---|--------------------------------------|
| ZENER CURRENT (I <sub>ZM</sub> )                                      | POWER DISSIPATION (P) | TEMPERATURE COEFFICIENT (T <sub>COEFF</sub> ) | EIA TYPE DESIGNATION (FOR REFERENCE) |
| MADC  | MW                    | %/°C  |                                      |
| 35  | 250                   | ±.002   | 1N825                                |

TABLE II

| ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) |                          |                 |                      |     |       |
|---|--------------------------|-----------------|----------------------|-----|-------|
| PARAMETER   | CONDITIONS               | SYMBOL          | SPECIFICATION LIMITS |     |       |
|   |                          |                 | MIN                  | MAX | UNITS |
| ZENER VOLTAGE   | I <sub>ZT</sub> = 7.5 MA | V <sub>Z</sub>  | 5.9                  | 6.5 | VOLTS |
| ZENER IMPEDANCE   | I <sub>ZT</sub> = 7.5 MA | Z <sub>ZT</sub> | —                    | 15  | OHMS  |

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63

|             |         |   |
|-------------|---------|---|
|             |         | UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES |
|             |         | TOLERANCES ON                                       |
|             |         | FRACTIONS DECIMALS ANGLES                           |
|             |         | ± ± ±   |
|             |         | DO NOT SCALE THIS DRAWING                           |
|             |         | MATERIAL  |
|             |         | SEE NOTES   |
|             |         | HEAT TREATMENT                                      |
|             |         | NONE  |
| NEXT ASSY   | USED ON | FINAL FINISH  |
|             |         | NONE  |
| APPLICATION |         |   |

|          |  |  |                  |
|----------|--|--|------------------|
| QTY REQD | PART OR IDENTIFYING NO.                        | NOMENCLATURE OR DESCRIPTION                | FIND NO.         |
|          |  | LIST OF MATERIALS                          |                  |
|          | MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.    | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |                  |
|          | DWG. NO. CONTRACT                              |  |                  |
|          | DRAWN <i>By [signature]</i> DATE <i>3/8/63</i> | SEMICONDUCTOR DEVICE, DIODE                |                  |
|          | CHECKED <i>S.S. [signature]</i> 3/9/63         | SPECIFICATION CONTROL DRAWING              |                  |
|          | APPROVAL <i>[signature]</i>                    |  |                  |
|          | APPROVAL                                       |  |                  |
|          | NASA APPROVAL <i>[signature]</i> 2/20/63       | CODE IDENT NO. SIZE                        | NASA DRAWING NO. |
|          | MIT APPROVAL <i>[signature]</i> 2/20/63        | C  | 1010259          |
|          |  | SCALE NONE WT                              | SHEET 2 OF 2     |

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# REQUIREMENTS:

## GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER NASA DOCUMENT 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

ELECTRICAL CHARACTERISTICS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

MARKING: MARK UNITS PER MIL-STD-130 WITH MANUFACTURER'S NAME OR SYMBOL, TYPE DESIGNATION, DATE CODE, LOT CODE AND SERIAL NUMBER.

## GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$

ELECTRICAL RATING: PER TABLE I

TOLERANCE:  $\pm 5\%$

ELECTRICAL SPECIFICATION: PER TABLE II

POWER DISSIPATION: 250 MILLIWATTS MAX

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002054.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER NASA DOCUMENT 1015404, CLASS 1.

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491 LEVEL A IN BOTH INSTANCES.

(1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

## GROUP III (SPECIAL CONDITIONING BY THE SUPPLIER):

BURN IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS.

1. AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$

2. POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  CASE TEMPERATURE RATING

DIODES WHICH FAIL TO MEET ALL INITIAL MEASUREMENTS AND THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN IN SHALL NOT BE ACCEPTABLE.

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN IN:

1. ZENER VOLTAGE ( $V_Z$ )

2. DYNAMIC IMPEDANCE ( $Z_{ZT}$ )

PARAMETRIC CHANGE LIMITS:

1. ZENER VOLTAGE:  $\pm 1\%$  OF INITIAL VALUE

2. DYNAMIC IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

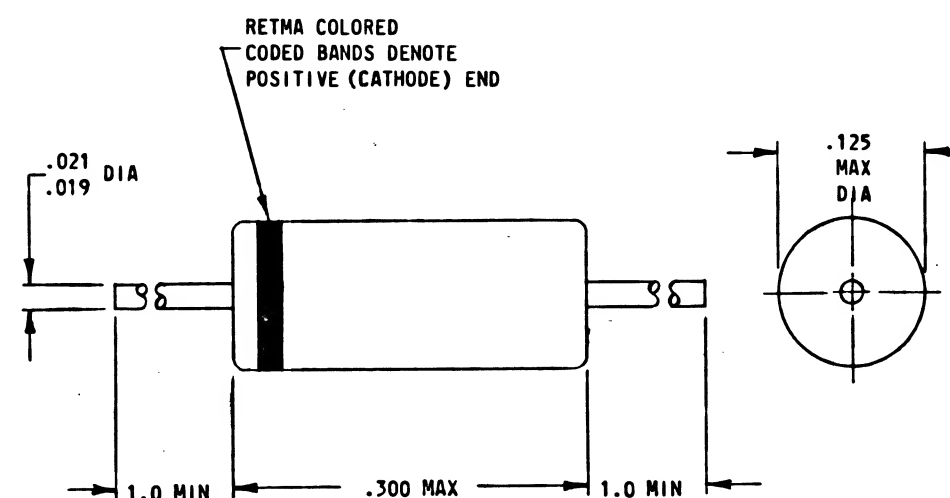
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

0920101

| REVISIONS |                                |        |          |
|-----------|--------------------------------|--------|----------|
| SYM       | DESCRIPTION                    | DATE   | APPROVAL |
| -         | SEE PROCUREMENT NOTE 1 PER TDR | 215-63 |          |
| A         | REVISED PER TDRR 00513         |        | W.R.     |

## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63



|                           |         |
|---------------------------|---------|
| A                         | -       |
| -                         | -       |
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

NOTES

|   |          |        |
|---|----------|--------|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES |          |        |
| TOLERANCES ON                                       |          |        |
| FRACTIONS   | DECIMALS | ANGLES |
| $\pm$   | $\pm$    | $\pm$  |
| DO NOT SCALE THIS DRAWING                           |          |        |
| MATERIAL  |          |        |
| SEE NOTES   |          |        |
| HEAT TREATMENT                                      |          |        |
| NONE  |          |        |
| FINAL FINISH  |          |        |
| NONE  |          |        |
| NEXT ASSY   | USED ON  |        |
| APPLICATION   |          |        |

| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                                  | FIND NO.                    |
|---|-------------------------|--|-----------------------------|
| LIST OF MATERIALS   |                         |  |                             |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.   |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                   |                             |
| DRAWN <i>Ray M. Baker</i> DATE 3/1/63<br>CHECKED <i>S.S. Baker</i> 3/1/63<br>APPROVAL <i>W.R. Baker</i><br>APPROVAL |                         | SEMICONDUCTOR DEVICE, DIODE<br>SPECIFICATION CONTROL DRAWING |                             |
| NASA APPROVAL <i>John B. Baker</i> 2/20/63<br>MIT APPROVAL <i>W.R. Baker</i> 20 Feb 63                              |                         | CODE IDENT NO. SIZE<br>C                                     | NASA DRAWING NO.<br>1010260 |
| SCALE NONE WT   |                         | SHEET 1 OF 2   |                             |

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY FOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THEREBY.

#### REQUIREMENTS:

##### GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER NASA DOCUMENT 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

ELECTRICAL CHARACTERISTICS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

MARKING: MARK UNITS PER MIL-STD-130 WITH MANUFACTURER'S NAME OR SYMBOL, TYPE DESIGNATION, DATE CODE, LOT CODE AND SERIAL NUMBER.

##### GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$

ELECTRICAL RATING: PER TABLE I

TOLERANCE:  $\pm 5\%$

ELECTRICAL SPECIFICATION: PER TABLE II

POWER DISSIPATION: 250 MILLIWATTS MAX

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002054.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER NASA DOCUMENT 1015404, CLASS F.

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19191 LEVEL A IN BOTH INSTANCES.

(1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19191 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

##### GROUP III (SPECIAL CONDITIONING BY THE SUPPLIER):

BURN IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS.

1. AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$

2. POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  CASE TEMPERATURE RATING

DIODES WHICH FAIL TO MEET ALL INITIAL MEASUREMENTS AND THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN IN SHALL NOT BE ACCEPTABLE.

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN IN:

1. ZENER VOLTAGE ( $V_Z$ )

2. DYNAMIC IMPEDANCE ( $Z_{ZT}$ )

PARAMETRIC CHANGE LIMITS:

1. ZENER VOLTAGE:  $\pm 1\%$  OF INITIAL VALUE

2. DYNAMIC IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

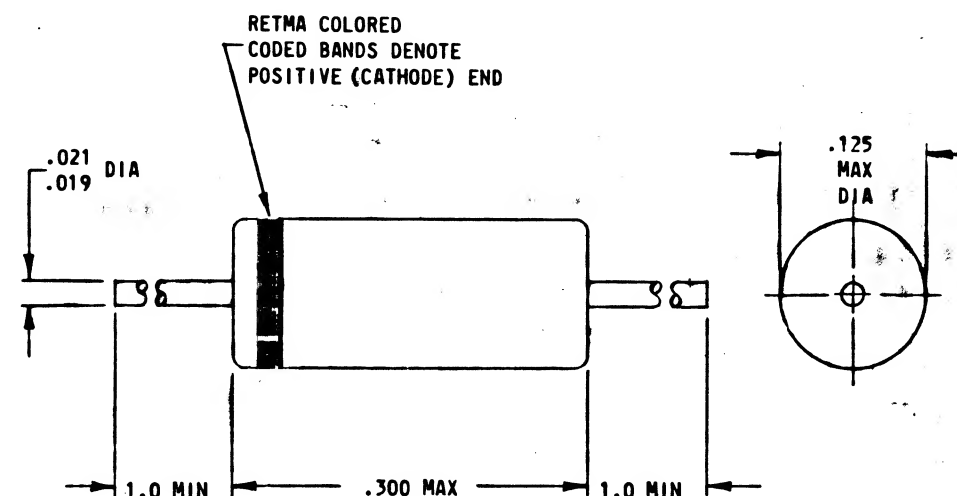
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

B 0920101

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION                                  | DATE    | APPROVAL |
| -         | SEE PROCUREMENT NOTE 1 PER TDR               | 215-63  |          |
| A         | REVISED PER TDR 00513                        |         | WR       |
| B         | REPLACED BY REV C WITH CHANGES PER TDR 02108 | 7/17/63 | WR       |

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-28-63



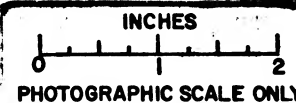
REPLACED BY REV C WITH CHANGES

|         |         |
|---------|---------|
| B       | B       |
| A       | -       |
| -       | -       |
| SHEET 1 | SHEET 2 |

REVISION STATUS OF SHEETS

|   |          |        |
|---|----------|--------|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES |          |        |
| TOLERANCES ON                                       |          |        |
| FRACTIONS   | DECIMALS | ANGLES |
| $\pm$   | $\pm$    | $\pm$  |
| DO NOT SCALE THIS DRAWING                           |          |        |
| MATERIAL  |          |        |
| SEE NOTES   |          |        |
| HEAT TREATMENT                                      |          |        |
| NONE  |          |        |
| FINAL FINISH  |          |        |
| NONE  |          |        |
| NEXT ASSY   | USED ON  |        |
| APPLICATION   |          |        |

| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                                  | FIND NO.                    |
|--|-------------------------|--|-----------------------------|
| LIST OF MATERIALS  |                         |  |                             |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                   |                             |
| DRAWN <i>Ray W. Baker</i> DATE 3/2/63<br>CHECKED <i>S.S. Miller</i> 3/9/63<br>APPROVAL <i>W. J. Carter</i><br>APPROVAL |                         | SEMICONDUCTOR DEVICE, DIODE<br>SPECIFICATION CONTROL DRAWING |                             |
| NASA APPROVAL <i>John B. ...</i> 2/20/63<br>MIT APPROVAL <i>W. J. ...</i> 2/20/63                                      |                         | CODE IDENT NO. SIZE<br>C                                     | NASA DRAWING NO.<br>1010260 |
| SCALE NONE   |                         | WT   | SHEET 1 OF 2                |



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| REVISIONS |   |         |          |
|-----------|---|---------|----------|
| SYM       | DESCRIPTION                                   | DATE    | APPROVAL |
| B         | REPLACED BY REV C WITH CHANGES PER TDRR 02108 | 7/17/63 | AM       |

TABLE I

| MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE = 25°C |   |                       |                                      |
|---|---|-----------------------|--------------------------------------|
| ZENER CURRENT (I <sub>ZM</sub> )                                      | ZENER CURRENT AT T <sub>A</sub> = 125°C | POWER DISSIPATION (P) | EIA TYPE DESIGNATION (FOR REFERENCE) |
| M <sub>ADC</sub>  | M <sub>ADC</sub>                        | MW                    |                                      |
| 20  | 4                                       | 250                   | 1N765-2                              |

TABLE II

| ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) |                        |                 |                      |       |       |
|---|------------------------|-----------------|----------------------|-------|-------|
| PARAMETER   | CONDITIONS             | SYMBOL          | SPECIFICATION LIMITS |       |       |
|   |                        |                 | MIN                  | MAX   | UNITS |
| ZENER VOLTAGE   | I <sub>ZT</sub> = 5 MA | V <sub>Z</sub>  | 10.45                | 11.55 | VOLTS |
| ZENER IMPEDANCE   | I <sub>ZT</sub> = 5 MA | Z <sub>ZT</sub> | -                    | 45    | OHMS  |

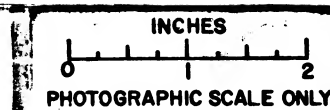
FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 8-20-63

ⓑ REPLACED BY REV C WITH CHANGES

POSTED

|  |                         |  |   |
|--|-------------------------|--|---|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.  |
| LIST OF MATERIALS  |                         |  |   |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.<br>DWS. NO. CONTRACT   |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |   |
| DRAWN <i>Agg. 3/1/63</i> DATE <i>3/1/63</i><br>CHECKED <i>SS. 3/1/63</i><br>APPROVAL <i>W. J. Austin</i><br>APPROVAL   |                         | SEMICONDUCTOR DEVICE, DIODE<br>SPECIFICATION CONTROL DRAWING                       |   |
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES<br>± ± ±<br>DO NOT SCALE THIS DRAWING<br>MATERIAL<br>SEE NOTES<br>HEAT TREATMENT<br>NONE<br>NEXT ASSY USED ON<br>APPLICATION |                         | NASA APPROVAL <i>Jack Bernal 3/1/63</i><br>MIT APPROVAL <i>W. J. Austin 3/1/63</i> | CODE IDENT NO. SIZE<br>C<br>SCALE NONE WT<br>SHEET 2 OF 2 |





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#### REQUIREMENTS:

##### GENERAL:

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING. LIFE TEST CONDITIONS SHALL BE THE SAME AS BURN-IN CONDITIONS.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS PER ND 1015404, CLASS 1.

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH ND1002129.

##### INSPECTION AND ACCEPTANCE:

LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

ELECTRICAL SPECIFICATIONS: PER TABLE II.

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

MARKING: MARK UNITS PER MIL-STD-130 WITH MANUFACTURER'S NAME OR SYMBOL, TYPE DESIGNATION, DATE CODE, AND SERIAL NUMBER.

##### DESIGN REQUIREMENTS:

ELECTRICAL SPECIFICATIONS: PER TABLE II.

MAXIMUM RATINGS: PER TABLE I.

STORAGE TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$ .

POWER DISSIPATION: 250 MILLIWATTS MAX. AT  $+25^{\circ}\text{C}$  AMBIENT TEMPERATURE.

THERMAL RESISTANCE: (JUNCTION TO AMBIENT AIR WITH CLIPS

1/2 INCH FROM BODY OF DIODE IN STILL, FREE AIR):

$.500^{\circ}\text{C}/\text{MW}$  MAX.

##### SPECIAL CONDITIONING BY SUPPLIER:

BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS.

AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$ ,  $-10^{\circ}\text{C}$ .

POWER DISSIPATION: 50 MILLIWATTS

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING

BURN-IN:

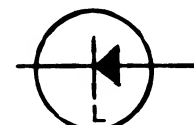
ZENER VOLTAGE

ZENER IMPEDANCE

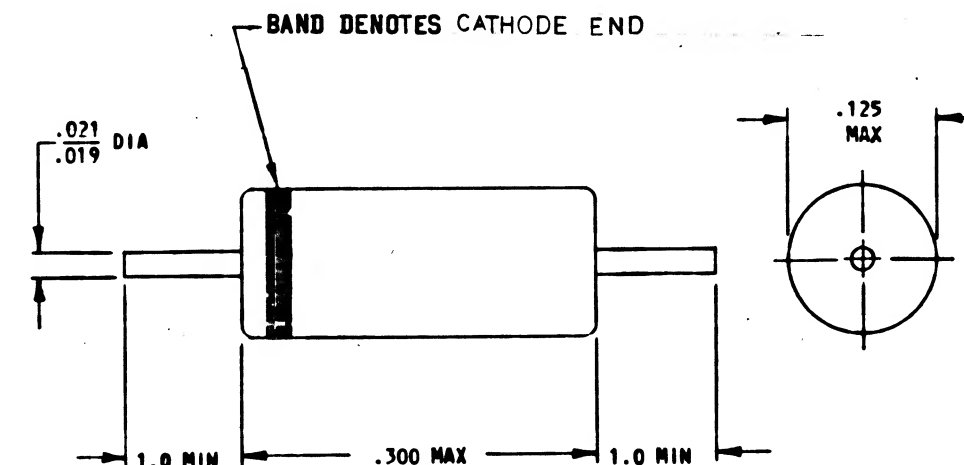
THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER



GRAPHICAL SYMBOL



|                           |         |
|---------------------------|---------|
|                           |         |
| C                         | C       |
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

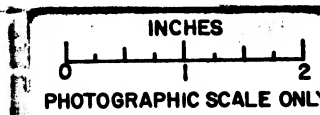
© REPLACES REV(B) WITH CHANGE

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|-------------|---------|
|             |         |
|             |         |
| NEXT ASSY   | USED ON |
| APPLICATION |         |

|   |          |        |
|---|----------|--------|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON |          |        |
| FRACTIONS   | DECIMALS | ANGLES |
| $\pm$   | $\pm$    | $\pm$  |
| DO NOT SCALE THIS DRAWING   |          |        |
| MATERIAL  |          |        |
| SEE NOTES   |          |        |
| HEAT TREATMENT  |          |        |
| NONE  |          |        |
| FINAL FINISH  |          |        |
| NONE  |          |        |

|   |              |
|---|--------------|
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS. |              |
| DRAWN <i>J. Perkins</i>                     | DATE 5-21-63 |
| CHECKED <i>Wilson</i>                       | 3 JUNE 63    |
| APPROVAL <i>A. R. Test</i>                  | 12 JUL 63    |
| NASA APPROVAL <i>W. S. Dwyer</i><br>7/17/63 |              |
| MIT APPROVAL <i>L. Nadel</i> 7/17/63        |              |

|  |         |
|--|---------|
| MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS   |         |
| SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REGULATOR, SILICON,<br>AXIAL LEAD, GLASS BODY) |         |
| SPECIFICATION CONTROL DRAWING  |         |
| CODE IDENT NO.   | SIZE    |
|  | C       |
| NASA DRAWING NO.   | 1010260 |
| SCALE NONE   | WT      |
| SHEET 1 OF 2   |         |



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|           |  |           |          |
|-----------|--|-----------|----------|
| C 0920101 |  | REVISIONS |          |
| SYM       | DESCRIPTION  | DATE      | APPROVAL |
| C         | REPLACES REV B WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02108 | 7/17/63   | PL       |

THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.

PARAMETRIC CHANGE LIMITS:  
ZENER VOLTAGE:  $\pm 1\%$  OF INITIAL VALUE  
ZENER IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

| TABLE I<br>ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE = 25°C |                       |   |  |
|---|-----------------------|---|--|
| ZENER CURRENT (I <sub>ZM</sub> )                                  | POWER DISSIPATION (P) | EIA TYPE DESIGNATION (FOR REFERENCE ONLY) |  |
| MADC  | MW                    |   |  |
| 20  | 250                   | 1N765-2                                   |  |

| TABLE II<br>ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) |                        |                 |                      |       |       |
|---|------------------------|-----------------|----------------------|-------|-------|
| PARAMETER   | CONDITIONS             | SYMBOL          | SPECIFICATION LIMITS |       |       |
|   |                        |                 | MIN                  | MAX   | UNITS |
| ZENER VOLTAGE   | I <sub>ZT</sub> = 5 MA | V <sub>Z</sub>  | 10.45                | 11.55 | VOLTS |
| ZENER IMPEDANCE   | I <sub>ZT</sub> = 5 MA | Z <sub>ZT</sub> | -                    | 45    | OHMS  |

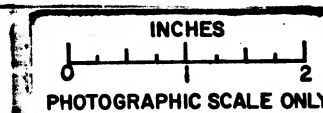
NOTES:

- ALL SPECIFICATIONS (EXCEPT FORWARD VOLTAGE DROP) ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.
- ZENER IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL

$$Z_Z = \frac{E(AC)}{I(AC)}$$

© REPLACES REV(B) WITH CHANGE

|             |         |   |   |  |           |   |  |
|-------------|---------|---|---|--|-----------|---|--|
|             |         | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>FRACTIONS DECIMALS ANGLES<br>$\pm$ $\pm$ $\pm$<br>DO NOT SCALE THIS DRAWING<br>MATERIAL<br>SEE NOTES |   | MIT<br>INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.<br>DWS: RD CONTRACT<br>DRAWN <i>J. Parker</i> DATE 5-31-63<br>CHECKED <i>Wilson</i> 3 JUNE 63<br>APPROVAL <i>B. R. Felt</i> 12 JUL 63<br>APPROVAL |           | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS<br>SEMICONDUCTOR DEVICE, DIODE<br>(VOLTAGE REGULATOR, SILICON,<br>AXIAL LEAD, GLASS BODY)<br>SPECIFICATION CONTROL DRAWING |  |
| NEXT ASSY   | USED ON | HEAT TREATMENT<br>NONE  | NASA APPROVAL <i>W. S. J. Jr</i><br>7/17/63 | CODE IDENT NO.   | SIZE<br>C | NASA DRAWING NO.<br>1010260   |  |
| APPLICATION |         | FINAL FINISH<br>NONE  | MIT APPROVAL <i>W. S. J. Jr</i><br>7/17/63  | SCALE NONE   | WT        | SHEET 2 OF 2  |  |



NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER. AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS:

GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER NASA DOCUMENT 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

ELECTRICAL CHARACTERISTICS: PER TABLE II

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

MARKING: MARK UNITS PER MIL-STD-130 WITH MANUFACTURER'S NAME OR SYMBOL, TYPE DESIGNATION, DATE CODE, LOT CODE AND SERIAL NUMBER.

GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$

ELECTRICAL RATING: PER TABLE I

TOLERANCE:  $\pm 5\%$

ELECTRICAL SPECIFICATION: PER TABLE II

POWER DISSIPATION: 250 MILLIWATTS MAX

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002054.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER NASA DOCUMENT 1015404, CLASS 1.

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491 LEVEL A IN BOTH INSTANCES.

(1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

GROUP III (SPECIAL CONDITIONING BY THE SUPPLIER):

BURN IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS.

1. AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$

2. POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  CASE TEMPERATURE RATING

DIODES WHICH FAIL TO MEET ALL INITIAL MEASUREMENTS AND THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN IN SHALL NOT BE ACCEPTABLE.

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN IN:

1. ZENER VOLTAGE ( $V_Z$ )

2. DYNAMIC IMPEDANCE ( $Z_{ZT}$ )

PARAMETRIC CHANGE LIMITS:

1. ZENER VOLTAGE:  $\pm 1\%$  OF INITIAL VALUE

2. DYNAMIC IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

PROCUREMENT NOTE:

A WAIVE AS REQUIRED ALL INFORMATION PRESENTED ON THIS DRAWING EXCEPT LEAD MATERIAL SPECIFICATION AND PHYSICAL DIMENSIONS

B UPON SPECIFIC INSTRUCTION BY TECHNICAL DIRECTIVE TO PROCURE THIS PART AS CHANGE SYMBOL ( ) BY ORDERING TO VENDOR CATALOGUE NUMBER & SPECIFICATIONS. REFERENCE ND 1002034 ( )

C DISREGARD THIS NOTE IN ITS ENTIRETY IF REFERENCE IS MADE TO THIS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

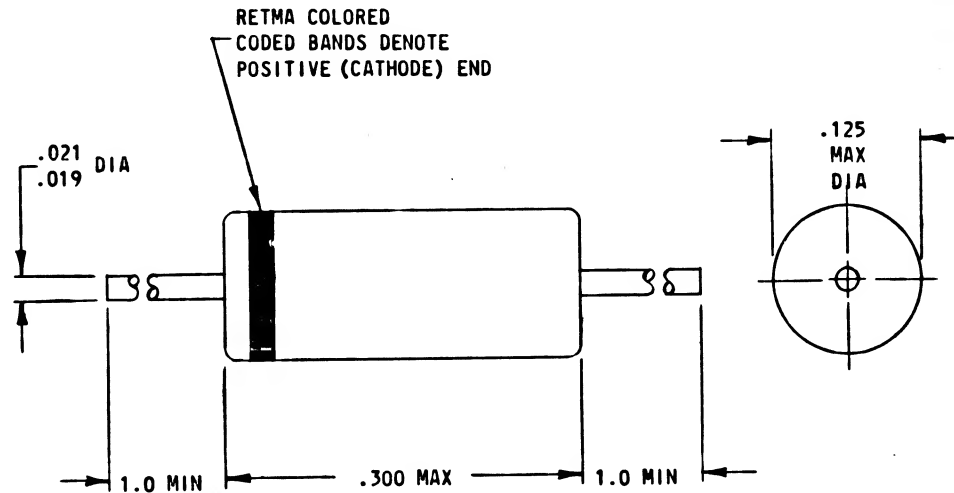
0920101

REVISIONS

| SYM | DESCRIPTION                    | DATE    | APPROVAL |
|-----|--------------------------------|---------|----------|
| -   | SEE PROCUREMENT NOTE 1 PER TDR | 2-15-63 |          |

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00436 DATE 2-20-63



|                           |         |
|---------------------------|---------|
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

MASTER

|   |                         |  |  |
|---|-------------------------|--|--|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                                  | FIND NO.                                 |
| LIST OF MATERIALS   |                         |  |  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.<br>CONTRACT   |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                   |  |
| DRAWN <i>Ray W. Kelly</i> DATE 3/1/63<br>CHECKED <i>S.S. Smith</i> 3/1/63<br>APPROVAL <i>W. J. Carter</i><br>APPROVAL |                         | SEMICONDUCTOR DEVICE, DIODE<br>SPECIFICATION CONTROL DRAWING |  |
| NASA APPROVAL <i>John B. ...</i> 2/20/63<br>MIT APPROVAL <i>W. J. ...</i> 2/20/63                                     |                         | CODE IDENT NO. C<br>SCALE NONE WT                            | NASA DRAWING NO. 1010260<br>SHEET 1 OF 2 |

|   |
|---|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES |
| TOLERANCES ON                                       |
| FRACTIONS DECIMALS ANGLES                           |
| $\pm$ $\pm$ $\pm$                                   |
| DO NOT SCALE THIS DRAWING                           |
| MATERIAL  |
| SEE NOTES   |
| HEAT TREATMENT                                      |
| NONE  |
| FINAL FINISH  |
| NONE  |

|             |         |
|-------------|---------|
| NEXT ASSY   | USED ON |
| APPLICATION |         |



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TABLE I

| MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT AMBIENT TEMPERATURE = 25°C |   |                       |                                      |
|---|---|-----------------------|--------------------------------------|
| ZENER CURRENT (I <sub>ZM</sub> )                                      | ZENER CURRENT AT T <sub>A</sub> = 125°C | POWER DISSIPATION (P) | EIA TYPE DESIGNATION (FOR REFERENCE) |
| M <sub>ADC</sub>  | M <sub>ADC</sub>                        | MW                    |                                      |
| 20  | 4                                       | 250                   | 1N765-2                              |

TABLE II

| ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) |                        |                 |                      |       |       |
|---|------------------------|-----------------|----------------------|-------|-------|
| PARAMETER   | CONDITIONS             | SYMBOL          | SPECIFICATION LIMITS |       |       |
|   |                        |                 | MIN                  | MAX   | UNITS |
| ZENER VOLTAGE   | I <sub>ZT</sub> = 5 MA | V <sub>Z</sub>  | 10.45                | 11.55 | VOLTS |
| ZENER IMPEDANCE   | I <sub>ZT</sub> = 5 MA | Z <sub>ZT</sub> | -                    | 45    | OHMS  |

0920101

REVISIONS

| SYM | DESCRIPTION | DATE | APPROVAL |
|-----|-------------|------|----------|
|-----|-------------|------|----------|

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CLASS B RELEASE TDR No. 00434 DATE 2-20-63

|   |                         |  |          |
|---|-------------------------|--|----------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                                  | FIND NO. |
| LIST OF MATERIALS                                 |                         |  |          |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.       |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                   |          |
| DRAWN <i>W. J. B. 1/10/63</i> DATE <i>3/10/63</i> |                         | SEMICONDUCTOR DEVICE, DIODE<br>SPECIFICATION CONTROL DRAWING |          |
| CHECKED <i>SS. 1/10/63</i> 3/10/63                |                         |  |          |
| APPROVAL <i>W. J. B. 1/10/63</i>                  |                         | NASA DRAWING NO. 1010260                                     |          |
| NASA APPROVAL <i>Jack B. 1/10/63</i>              |                         | CODE IDENT NO. C   | SIZE     |
| MIT APPROVAL <i>W. J. B. 1/10/63</i>              |                         | SCALE NONE   | WT       |
|   |                         | SHEET 2 OF 2   |          |

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#### NOTES:

##### 1. REQUIREMENTS:

- A. THESE RESISTORS SHALL MEET THE REQUIREMENTS OF MIL-R-18546/1. STYLE RE65, CHARACTERISTIC G, WITH THE EXCEPTIONS AND ADDITIONS LISTED.
- B. EXCEPTIONS:
- (1) CONFIGURATION: NO MOUNTING TABS AND WELDABLE AXIAL LEADS AS SHOWN.
  - (2) POWER RATING: 6 WATTS AT +40°C DERATED TO 3.8 WATTS AT +125°C AND ZERO WATTS AT +275°C. 10 WATTS MAY BE DISSIPATED AT 40°C WHEN A SUITABLE HEAT SINK IS EMPLOYED (STANDARD .040 ALUMINUM 5" X 7" X 2" CHASSIS OR EQUIVALENT).
  - (3) RESISTANCE-TEMPERATURE CHARACTERISTIC:  $\pm 20$  PPM/°C FROM -55°C TO +275°C EXCEPT FOR FRACTIONAL OHM RESISTORS AT THE LOW TEMPERATURES WHICH MAY BE AS HIGH AT  $\pm 60$  PPM/°C.
  - (4) RESISTANCE TOLERANCE, INITIAL:  $\pm 1.0\%$ .
  - (5) RESISTANCE VALUE RANGE: FROM 0.05 OHMS TO 2260 OHMS BASED ON A MINIMUM WIRE DIAMETER OF .001.
  - (6) MARKING: UNITS SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURERS NAME AND/OR SYMBOL, TYPE NUMBER, RESISTANCE VALUE AND TOLERANCE, WATTAGE RATING, AND A YELLOW DOT TO SIGNIFY BURN-IN COMPLETION. EACH CONTAINER SHALL CONTAIN THE NASA DRAWING AND DASH NUMBER PLUS THE REVISION LETTER.

##### C. ADDITIONS:

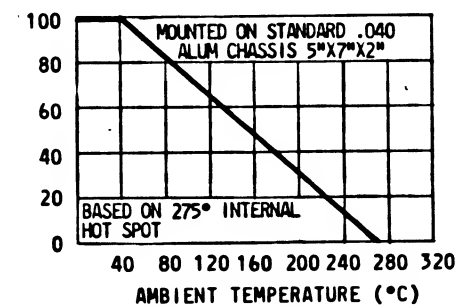
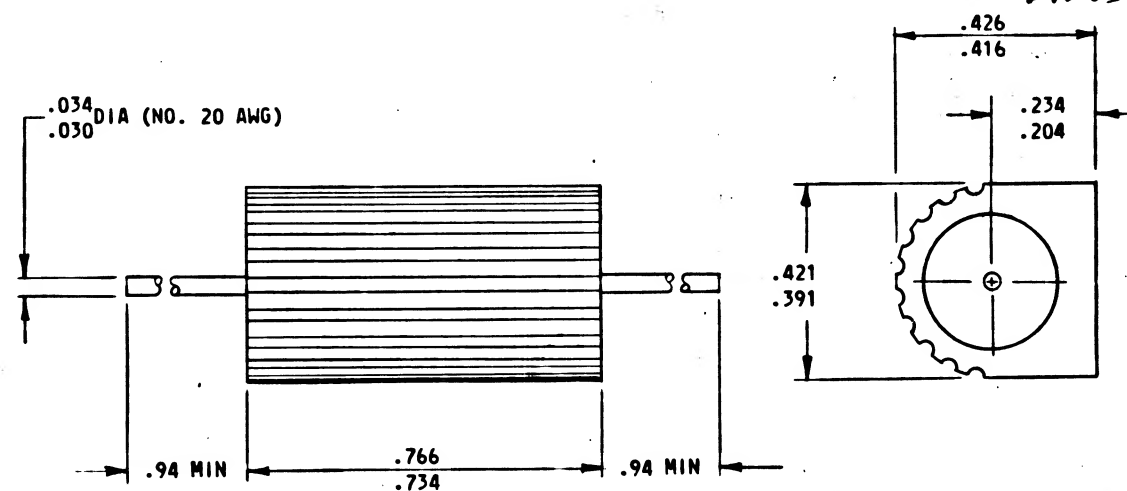
- (1) LEAD MATERIAL: PURE NICKEL WELDABLE (ALLOY 200) LEADS IN ACCORDANCE WITH ND PS 1015400.
- (2) LEAD STRENGTH: EACH LEAD SHALL BE CAPABLE OF WITHSTANDING A 4 POUND AXIAL PULL. THEY SHALL ALSO BE CAPABLE OF WITHSTANDING 2 CYCLES OF THE FOLLOWING TEST - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN THE VERTICAL AXIAL POSITION, BEND THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, THEN 90° BACK TO THE ORIGINAL POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.
- (3) QUALIFICATION: RESISTORS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002057.
- (4) QUALITY ASSURANCE: MANUFACTURER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 1, AS WELL AS MIL-R-18546.
- (5) BURN-IN: EVERY RESISTOR SHALL BE OPERATED FOR 100 HOURS AT 3.8 WATTS DISSIPATION AND +125°C AMBIENT TEMPERATURE.

##### 2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

| DASH NO. | NOMINAL RES-OHMS |
|----------|------------------|
| 1        | 525              |
| 2        | 630              |

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

|             |         |   |
|-------------|---------|---|
|             |         | UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES |
|             |         | $\pm$ $\pm$ $\pm$   |
|             |         | DO NOT SCALE THIS DRAWING   |
|             |         | MATERIAL  |
|             |         | SEE NOTES   |
|             |         | HEAT TREATMENT  |
|             |         | NONE  |
| NEXT ASSY   | USED ON | FINAL FINISH  |
|             |         | NONE  |
| APPLICATION |         |   |



|         |   |  |                             |
|---------|---|--|-----------------------------|
| QTY REQ | PART OR IDENTIFYING NO.   | NOMENCLATURE OR DESCRIPTION                          | FIND NO.                    |
|         |   | LIST OF MATERIALS                                    |                             |
|         | MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.   | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS           |                             |
|         | DRAWN <i>D. Bergman</i> DATE <i>2/20/63</i><br>CHECKED <i>D. M. Slusher</i> DATE <i>30 Jan 63</i><br>APPROVAL <i>W. J. Beaton</i><br>APPROVAL | RESISTOR, FIXED, WW<br>SPECIFICATION CONTROL DRAWING |                             |
|         | NASA APPROVAL <i>Jack Bergman</i> DATE <i>2/20/63</i><br>MIT APPROVAL <i>20 Feb 63 WJH</i>  | CODE IDENT NO. SIZE<br>C                             | NASA DRAWING NO.<br>1010262 |
|         |   | SCALE NONE WT  | SHEET 1 OF 1                |

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##### C. ADDITIONS:

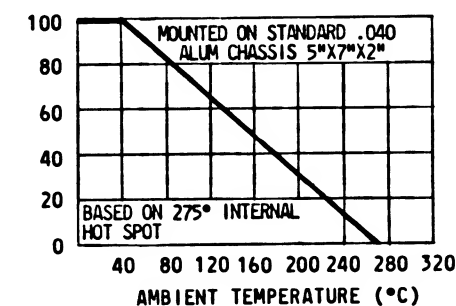
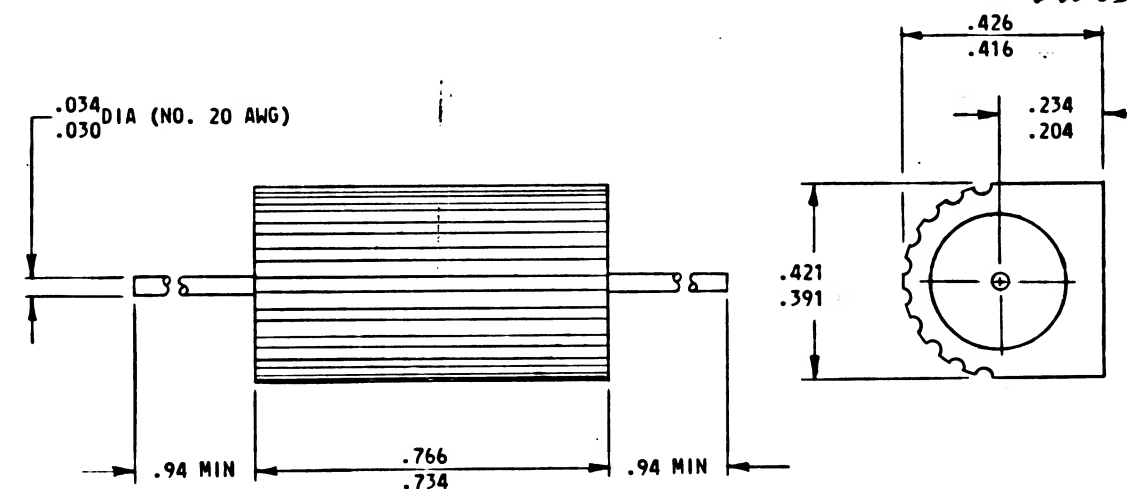
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- (5) BURN-IN: EVERY RESISTOR SHALL BE OPERATED FOR 100 HOURS AT 3.8 WATTS DISSIPATION AND +125°C AMBIENT TEMPERATURE.

##### 2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

| DASH NO | NOMINAL RES - OHMS |
|---------|--------------------|
| 1       | 525                |
| 2       | 630                |
| 3       | 272                |

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

|             |         |   |
|-------------|---------|---|
|             |         | UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES |
|             |         | TOLERANCES ON                                       |
|             |         | FRACTIONS DECIMALS ANGLES                           |
|             |         | $\pm$ $\pm$ $\pm$                                   |
|             |         | DO NOT SCALE THIS DRAWING                           |
|             |         | MATERIAL  |
|             |         | SEE NOTES   |
|             |         | HEAT TREATMENT                                      |
|             |         | NONE  |
| NEXT ASSY   | USED ON | FINAL FINISH  |
|             |         | NONE  |
| APPLICATION |         |   |



|  |                         |  |                             |
|--|-------------------------|--|-----------------------------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                          | FIND NO.                    |
| LIST OF MATERIALS  |                         |  |                             |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.<br>DWS. NO. CONTRACT   |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS           |                             |
| DRAWN <i>D. Bergman</i> DATE <i>2 Jan 63</i><br>CHECKED <i>D. M. Soper</i> DATE <i>30 Jan 63</i><br>APPROVAL <i>W. J. Beaton</i><br>APPROVAL |                         | RESISTOR, FIXED, WW<br>SPECIFICATION CONTROL DRAWING |                             |
| NASA APPROVAL <i>Jack Darnall</i> DATE <i>2/20/63</i><br>MIT APPROVAL <i>20 Feb 63 W. J. Beaton</i>  |                         | CODE IDENT NO. SIZE<br>C                             | NASA DRAWING NO.<br>1010262 |
| SCALE NONE   |                         | WT   | SHEET 1 OF 1                |

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0 1 2  
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##### 2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

| DASH NO | NOMINAL RES - OHMS |
|---------|--------------------|
| 1       | 525                |
| 2       | 630                |
| 3       | 272                |
| 4       | 260                |
| 5       | 257                |
| 6       | 250                |

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

|  |  |  |
|--|--|--|
|  |  | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>FRACTIONS DECIMALS ANGLES<br>$\pm$ $\pm$ $\pm$<br>DO NOT SCALE THIS DRAWING<br>MATERIAL<br>SEE NOTES<br>HEAT TREATMENT<br>NONE<br>FINAL FINISH<br>NONE<br>NEXT ASSY<br>USED ON<br>APPLICATION |
|--|--|--|

|  |                         |  |                             |
|--|-------------------------|--|-----------------------------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                          | FIND NO.                    |
| LIST OF MATERIALS  |                         |  |                             |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS           |                             |
| DRAWN <i>D. Bergman</i> DATE <i>2 Jan 63</i><br>CHECKED <i>D. M. Shapiro</i> 30 Jan 63<br>APPROVAL <i>W. J. Beaton</i><br>APPROVAL |                         | RESISTOR, FIXED, WW<br>SPECIFICATION CONTROL DRAWING |                             |
| NASA APPROVAL <i>Jack Bergman</i> 2/20/63<br>MIT APPROVAL <i>20 Feb 63 W. J. Beaton</i>  |                         | CODE IDENT NO. SIZE<br>C                             | NASA DRAWING NO.<br>1010262 |
| SCALE NONE   |                         | WT   | SHEET 1 OF 1                |

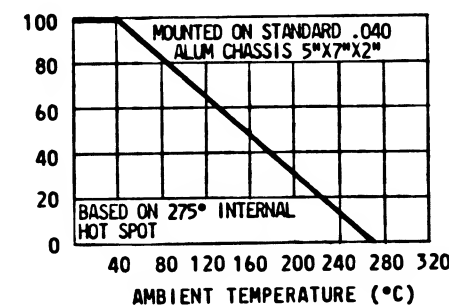
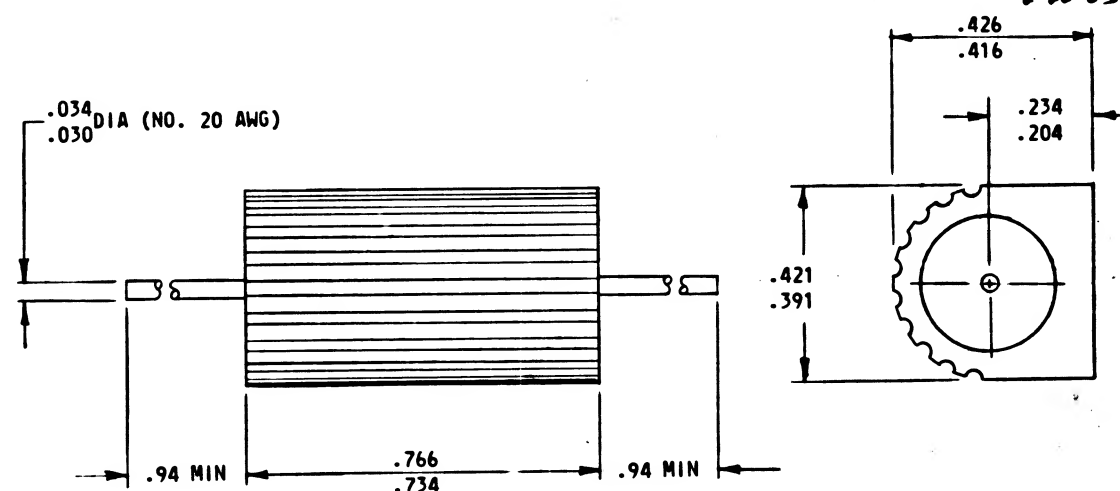
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PHOTOGRAPHIC SCALE ONLY

2920101

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| -         | TAKEN FROM BUWPS SCD 2318841<br>SEE PROCUREMENT NOTE 3 |         |          |
| A         | REVISED PER TDRR 00513                                 |         | WHL      |
| B         | REVISED PER TDRR 00623                                 | 3-10-63 | WHL      |
| C         | REVISED PER TDRR 00968                                 | 4-24-63 | WHL      |

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CLASS B RELEASE TDR No. 00434 DATE 2-20-63



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- B. EXCEPTIONS:
- (1) CONFIGURATION: NO MOUNTING TABS AND WELDABLE AXIAL LEADS AS SHOWN.
  - (2) POWER RATING: 6 WATTS AT +40°C DERATED TO 3.8 WATTS AT +125°C AND ZERO WATTS AT +275°C. 10 WATTS MAY BE DISSIPATED AT 40°C WHEN A SUITABLE HEAT SINK IS EMPLOYED (STANDARD .040 ALUMINUM 5" X 7" X 2" CHASSIS OR EQUIVALENT).
  - (3) RESISTANCE-TEMPERATURE CHARACTERISTIC:  $\pm 20$  PPM/°C FROM -55°C TO +275°C EXCEPT FOR FRACTIONAL OHM RESISTORS AT THE LOW TEMPERATURES WHICH MAY BE AS HIGH AT  $\pm 60$  PPM/°C.
  - (4) RESISTANCE TOLERANCE, INITIAL:  $\pm 1.0\%$ .
  - (5) RESISTANCE VALUE RANGE: FROM 0.05 OHMS TO 2260 OHMS BASED ON A MINIMUM WIRE DIAMETER OF .001.
  - (6) MARKING: UNITS SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURERS NAME AND/OR SYMBOL, TYPE NUMBER, RESISTANCE VALUE AND TOLERANCE, WATTAGE RATING, AND A YELLOW DOT TO SIGNIFY BURN-IN COMPLETION. EACH CONTAINER SHALL CONTAIN THE NASA DRAWING AND DASH NUMBER PLUS THE REVISION LETTER.

#### C. ADDITIONS:

- (1) LEAD MATERIAL: PURE NICKEL WELDABLE (ALLOY 200) LEADS IN ACCORDANCE WITH ND1015400.
- (2) LEAD STRENGTH: EACH LEAD SHALL BE CAPABLE OF WITHSTANDING A 4 POUND AXIAL PULL. THEY SHALL ALSO BE CAPABLE OF WITHSTANDING 2 CYCLES OF THE FOLLOWING TEST - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN THE VERTICAL AXIAL POSITION, BEND THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, THEN 90° BACK TO THE ORIGINAL POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.
- (3) QUALIFICATION: RESISTORS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002057.
- (4) QUALITY ASSURANCE: MANUFACTURER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS OF ND 1015404 CLASS 3, WELL AS MIL-R-18546.
- (5) BURN-IN: EVERY RESISTOR SHALL BE OPERATED FOR 100 HOURS AT 3.8 WATTS DISSIPATION AND +125°C AMBIENT TEMPERATURE.

#### 2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

| DASH NO | NOMINAL RES - OHMS |
|---------|--------------------|
| 1       | 525                |
| 2       | 630                |
| 3       | 272                |
| 4       | 260                |
| 5       | 257                |
| 6       | 250                |
| 7       | 6000               |

PROCURE ONLY FROM APPROVED SOURCES LISTED  
IN ND1002034 FOR THIS DRAWING.

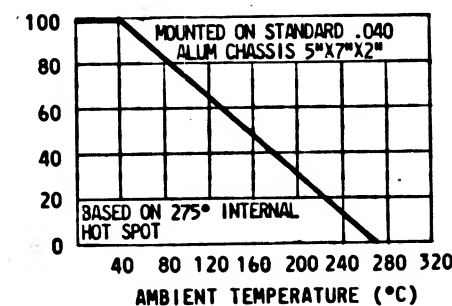
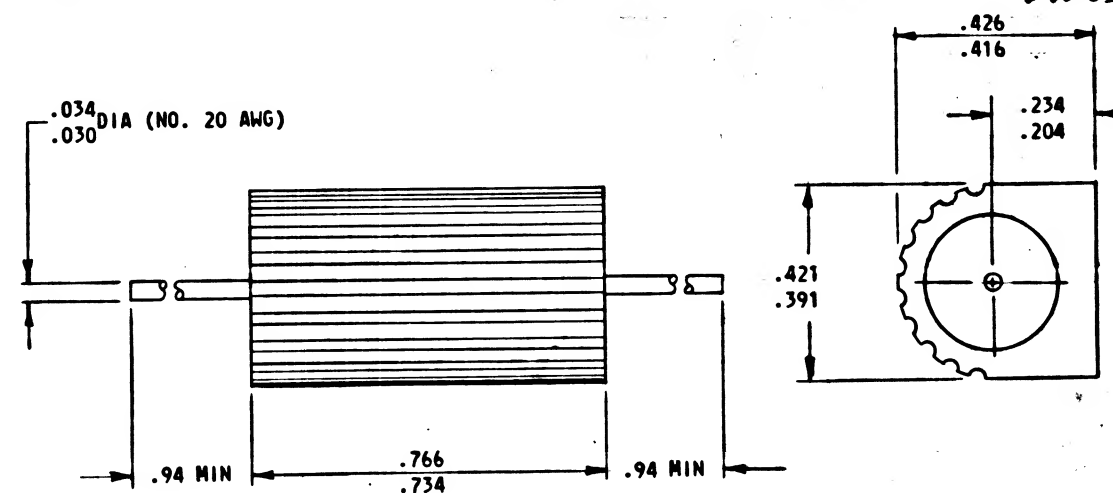
MASTER

1010262

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| -         | TAKEN FROM BUWEP SCD 2318841<br>SEE PROCUREMENT NOTE 3 |         |          |
| A         | REVISED PER TDR 00513                                  | 3-10-63 | WHL      |
| B         | REVISED PER TDR 00623                                  | 4-24-63 | WHL      |
| C         | REVISED PER TDR 00968                                  | 5-15-63 | WHL      |
| D         | REVISED PER TDR 01272                                  |         |          |

## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63



MASTER

|  |                         |  |                             |
|--|-------------------------|--|-----------------------------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                          | FIND NO.                    |
| LIST OF MATERIALS  |                         |  |                             |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS           |                             |
| DRAWN <i>D. Bagshaw</i> DATE 2 Jan 63<br>CHECKED <i>D. M. Slupen</i> 20 Jan 63<br>APPROVAL <i>W. J. Beaton</i><br>APPROVAL |                         | RESISTOR, FIXED, WW<br>SPECIFICATION CONTROL DRAWING |                             |
| HEAT TREATMENT<br>NONE   |                         | NASA APPROVAL <i>Jack Bagshaw</i> 2/20/63            | CODE IDENT NO. SIZE<br>C    |
| MATERIAL<br>SEE NOTES  |                         | MIT APPROVAL <i>20 Feb 63 W. J. Beaton</i>           | NASA DRAWING NO.<br>1010262 |
| NEXT ASSY USED ON  |                         | SCALE NONE   | WT SHEET 1 OF 1             |
| APPLICATION  |                         |  |                             |

INCHES  
0 1 2  
PHOTOGRAPHIC SCALE ONLY

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPORTED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THEREBY.

#### NOTES:

#### 1. REQUIREMENTS:

- A. THESE RESISTORS SHALL MEET THE REQUIREMENTS OF MIL-R-18546/1. STYLE RE65, CHARACTERISTIC G, WITH THE EXCEPTIONS AND ADDITIONS LISTED.
- B. EXCEPTIONS:
- (1) CONFIGURATION: NO MOUNTING TABS AND WELDABLE AXIAL LEADS AS SHOWN.
  - (2) POWER RATING: 6 WATTS AT +40°C DERATED TO 3.8 WATTS AT +125°C AND ZERO WATTS AT +275°C. 10 WATTS MAY BE DISSIPATED AT 40°C WHEN A SUITABLE HEAT SINK IS EMPLOYED (STANDARD .040 ALUMINUM 5" X 7" X 2" CHASSIS OR EQUIVALENT).
  - (3) RESISTANCE-TEMPERATURE CHARACTERISTIC:  $\pm 20$  PPM/°C FROM -55°C TO +275°C EXCEPT FOR FRACTIONAL OHM RESISTORS AT THE LOW TEMPERATURES WHICH MAY BE AS HIGH AT  $\pm 60$  PPM/°C.
  - (4) RESISTANCE TOLERANCE, INITIAL:  $\pm 1.0\%$ .
  - (5) RESISTANCE VALUE RANGE: FROM 0.05 OHMS TO 2260 OHMS BASED ON A MINIMUM WIRE DIAMETER OF .001.
  - (6) MARKING: UNITS SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURERS NAME AND/OR SYMBOL, TYPE NUMBER, RESISTANCE VALUE AND TOLERANCE, WATTAGE RATING, AND A YELLOW DOT TO SIGNIFY BURN-IN COMPLETION. EACH CONTAINER SHALL CONTAIN THE NASA DRAWING AND DASH NUMBER PLUS THE REVISION LETTER.
- C. ADDITIONS:
- (1) LEAD MATERIAL: PURE NICKEL WELDABLE (ALLOY 200) LEADS IN ACCORDANCE WITH ND1015400.
  - (2) LEAD STRENGTH: EACH LEAD SHALL BE CAPABLE OF WITHSTANDING A 4 POUND AXIAL PULL. THEY SHALL ALSO BE CAPABLE OF WITHSTANDING 2 CYCLES OF THE FOLLOWING TEST - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN THE VERTICAL AXIAL POSITION, BEND THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, THEN 90° BACK TO THE ORIGINAL POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.
  - (3) QUALIFICATION: RESISTORS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002057.
  - (4) QUALITY ASSURANCE: MANUFACTURER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS OF ND1015404 CLASS 3, WELL AS MIL-R-18546.
  - (5) BURN-IN: EVERY RESISTOR SHALL BE OPERATED FOR 100 HOURS AT 3.8 WATTS DISSIPATION AND +125°C AMBIENT TEMPERATURE.

#### 2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

| DASH NO | NOMINAL RES-OHMS |
|---------|------------------|
| 1       | 525              |
| 2       | 630              |
| 3       | 272              |
| 4       | 260              |
| 5       | 257              |
| 6       | 250              |
| 7       | 6000             |

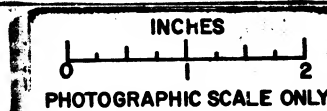
PROCURE ONLY FROM APPROVED SOURCES LISTED  
ND1002034 FOR THIS DRAWING.

REPLACED BY REV F WITH CHANGES  
PER TDRR

MASTER

|             |         |   |
|-------------|---------|---|
|             |         | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>FRACTIONS DECIMALS ANGLES<br>$\pm$ $\pm$ $\pm$<br>DO NOT SCALE THIS DRAWING<br>MATERIAL<br>SEE NOTES<br>HEAT TREATMENT<br>NONE<br>FINAL FINISH<br>NONE |
| NEXT ASSY   | USED ON |   |
| APPLICATION |         |   |

|   |                         |  |                             |
|---|-------------------------|--|-----------------------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                          | FIND NO.                    |
| LIST OF MATERIALS   |                         |  |                             |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.<br>DWS. NO. CONTRACT  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS           |                             |
| DRAWN <i>D. B. B. B.</i> DATE <i>2/20/63</i><br>CHECKED <i>D. M. B. B.</i> 30 Jan 63<br>APPROVAL <i>W. J. B. B.</i><br>APPROVAL |                         | RESISTOR, FIXED, WW<br>SPECIFICATION CONTROL DRAWING |                             |
| NASA APPROVAL <i>Jack B. B. B.</i> 2/20/63<br>MIT APPROVAL <i>20 Feb 63 W. J. B. B.</i>   |                         | CODE IDENT NO.<br>C                                  | NASA DRAWING NO.<br>1010262 |
| SCALE NONE  |                         | WT   | SHEET 1 OF 1                |

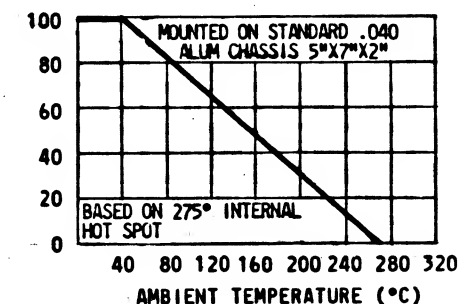
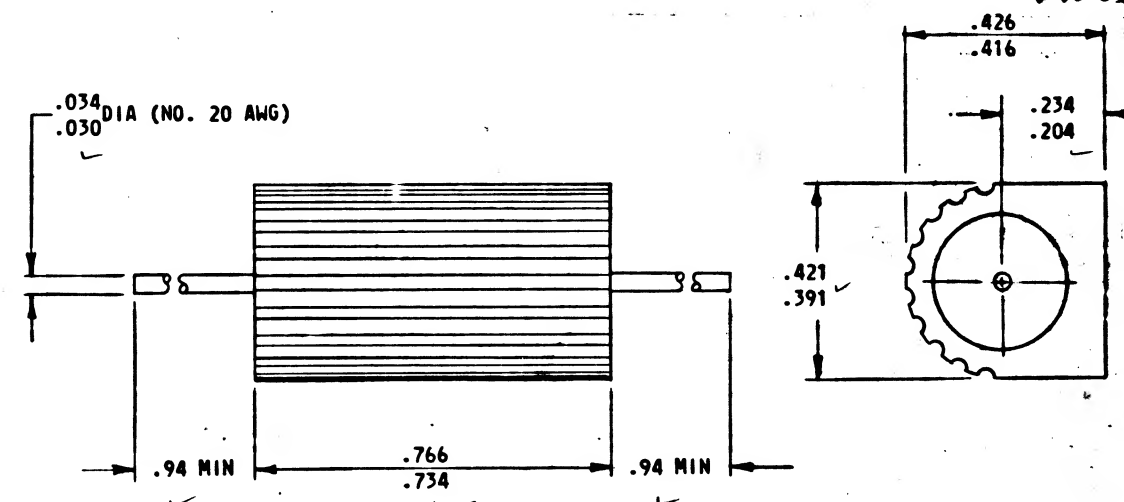


1010262

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| -         | TAKEN FROM BUWEP SCD 2318841<br>SEE PROCUREMENT NOTE 3 |         |          |
| A         | REVISED PER TDRR 00513                                 |         | WR       |
| B         | REVISED PER TDRR 00623                                 | 3-10-63 | WR       |
| C         | REVISED PER TDRR 00968                                 | 4-24-63 | WR       |
| D         | REVISED PER TDRR 01272                                 | 5-15-63 | WR       |
| E         | REPLACED BY REV F WITH<br>CHANGES PER TDRR 02094       | 7-1-63  | WR       |

## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 3-20-63



MASTER



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F 1010262

| REVISIONS |  |        |          |
|-----------|--|--------|----------|
| SYM       | DESCRIPTION  | DATE   | APPROVAL |
| F         | REPLACES REV E WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDOR 02094 | 7/1/63 | JW       |

# REQUIREMENTS:

## GENERAL:

INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH THE GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.

QUALITY ASSURANCE: MANUFACTURER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 2. THESE RESISTORS SHALL MEET THE REQUIREMENTS OF MIL-R-18546/1. STYLE RE65, CHARACTERISTIC G, EXCEPT AS SPECIFIED HEREIN.

PACKAGING: UNITS SHALL BE PACKAGED PER MIL-R-18546, LEVEL A.

## INSPECTION AND ACCEPTANCE:

### ELECTRICAL REQUIREMENTS:

RESISTANCE VALUE: PER TABLE.

RESISTANCE TOLERANCE, INITIAL:  $\pm 1.0\%$ .

MECHANICAL REQUIREMENTS: THE MANUFACTURER'S NAME OR SYMBOL, THE NASA DRAWING NUMBER, DASH NUMBER (IF ANY), REVISION LETTER, DATE CODE, SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER MIL-STD-130. ALSO INDICATE RESISTANCE VALUE AND TOLERANCE, WATTAGE RATING, (5 WATTS) AND A YELLOW DOT TO SIGNIFY BURN-IN COMPLETION. THE MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH CONTAINER SHALL CONTAIN THE NASA PART NUMBER PLUS THE REVISION LETTER.

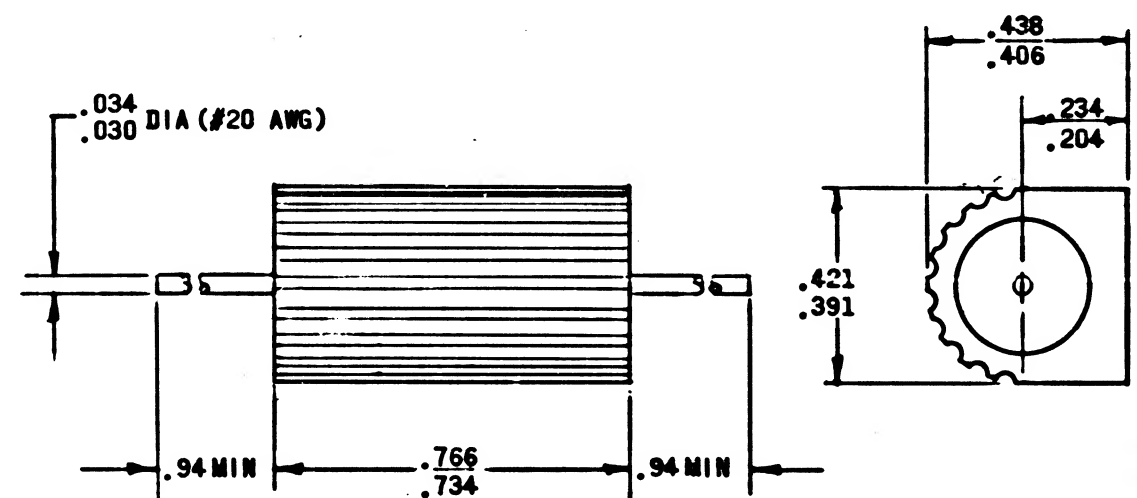
LEAD MATERIAL: PURE NICKEL WELDABLE LEADS IN ACCORDANCE WITH ND 1015400. A CERTIFICATE OF COMPLIANCE TO THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

## DESIGN REQUIREMENTS:

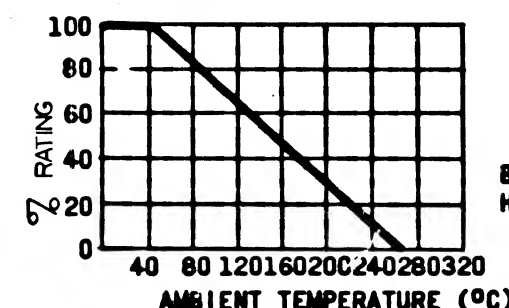
POWER RATING: 5 WATTS AT  $+25^{\circ}\text{C}$  DERATED TO 3.0 WATTS AT  $+125^{\circ}\text{C}$  AND ZERO WATTS AT  $+275^{\circ}\text{C}$ . 10 WATTS MAY BE DISSIPATED AT  $40^{\circ}\text{C}$  WHEN A SUITABLE HEAT SINK IS EMPLOYED (STANDARD .040 ALUMINUM 5" X 7" X 2" CHASSIS OR EQUIVALENT).

RESISTANCE-TEMPERATURE CHARACTERISTIC:  $\pm 26 \text{ PPM}/^{\circ}\text{C}$  FROM  $-55^{\circ}\text{C}$  TO  $+275^{\circ}\text{C}$  EXCEPT FOR FRACTIONAL OHM RESISTORS AT THE LOW TEMPERATURES WHICH MAY BE AS HIGH AS  $\pm 60 \text{ PPM}/^{\circ}\text{C}$ .

LEAD STRENGTH: EACH LEAD SHALL BE CAPABLE OF WITHSTANDING A 4 POUND AXIAL PULL. THEY SHALL ALSO BE CAPABLE OF WITHSTANDING 2 CYCLES OF THE FOLLOWING TEST-WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN THE VERTICAL AXIAL POSITION, BEND THE RESISTOR BODY SMOOTHLY IN A PLANE  $90^{\circ}$  TO ONE SIDE, THEN  $180^{\circ}$  BACK TO THE OPPOSITE EXTREME, THEN  $90^{\circ}$  BACK TO THE ORIGINAL POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.



MOUNTED ON STANDARD .040 ALUM CHASSIS 5"X7"X2"



BASED ON  $270^{\circ}\text{C}$  INTERNAL HOT SPOT

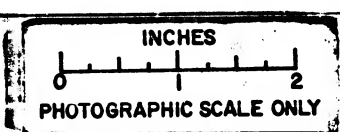
| F                         | F       |
|---------------------------|---------|
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

## F REPLACES REV(E) WITH CHANGE

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

|             |         |   |
|-------------|---------|---|
|             |         | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>FRACTIONS      DECIMALS      ANGLES<br>± —      ± —      ± — |
|             |         |   |
|             |         |   |
|             |         |   |
|             |         |   |
|             |         |   |
|             |         | DO NOT SCALE THIS DRAWING   |
|             |         | MATERIAL  |
|             |         | SEE NOTES   |
|             |         | HEAT TREATMENT  |
|             |         | NONE  |
| NEXT ASSY   | USED ON | FINAL FINISH  |
| APPLICATION |         | NONE  |

|  |                         |  |         |
|--|-------------------------|--|---------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                | FIG NO. |
|  |                         |  |         |
| LIST OF MATERIALS  |                         |  |         |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.<br>CONTRACT NAS9-497 |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |         |
| DRAWN J. Parkey DATE 6 JUN 63                                    |                         | RESISTOR, FIXED, WW                        |         |
| CHECKED J. Parkey DATE 7/1/63                                    |                         |  |         |
| APPROVAL J. Parkey 7/1/63  |                         |  |         |
| NASA APPROVAL W. J. Parkey 7-17-63                               |                         | CODE IDENT NO.                             | SIZE    |
| MIT APPROVAL J. Parkey 7/1/63                                    |                         | SCALE NONE                                 | WT      |
|  |                         | SPECIFICATION CONTROL DRAWING              |         |
|  |                         | NASA DRAWING NO. 1010262                   |         |
|  |                         | SHEET 1 OF 2                               |         |



PER THE REQUIREMENTS OF MIL-R-18546/1 AS MODIFIED HEREIN.  
CONSTRUCTION: STYLE RE65 MODIFIED PER OUTLINE SHOWN.

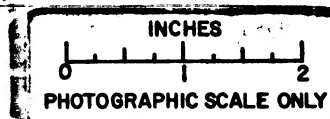
**BURN-IN: UNITS SHALL BE OPERATED FOR 100 HOURS AT 5.0 WATTS DISSIPATION AND +25°C AMBIENT TEMPERATURE. THE RESISTANCE CHANGE SHALL NOT EXCEED .5% AND THE UNITS SHALL BE WITHIN INITIAL LIMITS.**

| DASH NO. | NOMINAL RES-OHMS |
|----------|------------------|
| 1        | 525              |
| 2        | 630              |
| 3        | 272              |
| 4        | 260              |
| 5        | 257              |
| 6        | 250              |
| 7        | 6000             |

THE COMPLETE PART NUMBER SHALL BE THIS  
DRAWING NUMBER PLUS THE APPLICABLE DASH  
NUMBER.

F\_ THIS SHEET ADDED

|             |  |   |  |  |  |  |                  |
|-------------|--|---|--|--|--|--|------------------|
|             |  | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>FRACTIONS    DECIMALS    ANGLES<br>±                   ±                   ± |  | MIT<br>INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DWG. NO. <u>WAS-497</u><br>CONTRACT NO. <u>NSR-111123</u>   |  | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |                  |
|             |  | DO NOT SCALE THIS DRAWING<br>MATERIAL   |  | DRAWN <u>J. G. Jones</u> DATE <u>1/19/63</u><br>CHECKED <u>P. G. Jones</u> DATE <u>1/19/63</u><br>APPROVAL <u>W. H. Jones</u> DATE <u>7/1/63</u><br>APPROVAL _____ |  | RESISTOR, FIXED, WW                        |                  |
|             |  | HEAT TREATMENT  |  | NASA APPROVAL <u>W. H. Jones</u><br><u>7-17-63</u>   |  | SPECIFICATION CONTROL DRAWING              |                  |
| NEXT ASSY   |  | USED ON   |  | CODE IDENT NO.   |  | SIZE                                       | NASA DRAWING NO. |
|             |  |   |  |  |  | C  | 1010262          |
| APPLICATION |  | FINAL FINISH  |  | MIT APPROVAL <u>W. H. Jones</u> DATE <u>7/1/63</u>   |  | SCALE                                      | SHEET 2 OF 2     |



NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED AS IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSE THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THEREBY.

#### REQUIREMENTS:

##### 1. GENERAL:

- INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH THE GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
- QUALITY ASSURANCE: MANUFACTURER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 2.
- THESE RESISTORS SHALL MEET THE REQUIREMENTS OF MIL-R-18546/1, STYLE REG5, CHARACTERISTIC 6, EXCEPT AS SPECIFIED HEREIN.
- PACKAGING: UNITS SHALL BE PACKAGED PER MIL-R-18546, LEVEL A.

##### 2. INSPECTION AND ACCEPTANCE:

###### A. ELECTRICAL REQUIREMENTS:

- RESISTANCE VALUE: PER TABLE.
- RESISTANCE TOLERANCE, INITIAL:  $\pm 1.0\%$ .

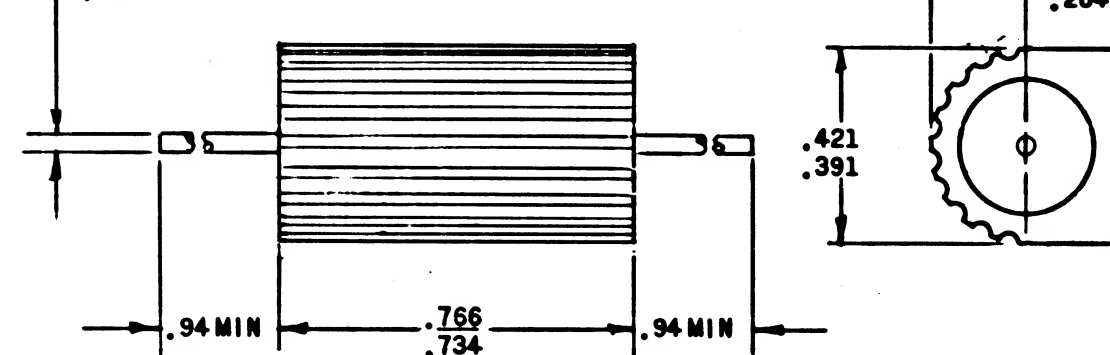
###### B. MECHANICAL REQUIREMENTS: THE MANUFACTURER'S NAME OR SYMBOL, THE NASA DRAWING NUMBER, DASH NUMBER (IF ANY), REVISION LETTER, DATE CODE, SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019. ALSO INDICATE RESISTANCE VALUE AND TOLERANCE, WATTAGE RATING, (5 WATTS) AND A YELLOW DOT TO SIGNIFY BURN-IN COMPLETION. THE MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH CONTAINER SHALL CONTAIN THE NASA PART NUMBER PLUS THE REVISION LETTER.

###### C. LEAD MATERIAL: PURE NICKEL WELDABLE LEADS IN ACCORDANCE WITH ND 1015400. A CERTIFICATE OF COMPLIANCE TO THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

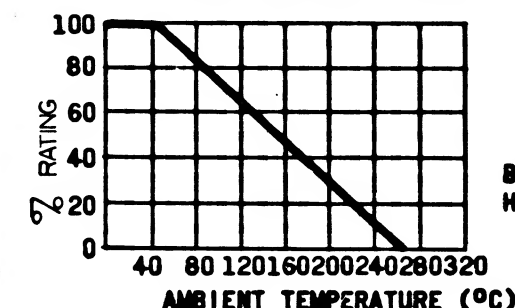
##### 3. DESIGN REQUIREMENTS:

- POWER RATING: 5 WATTS AT  $+25^{\circ}\text{C}$  DERATED TO 3.0 WATTS AT  $+125^{\circ}\text{C}$  AND ZERO WATTS AT  $+275^{\circ}\text{C}$ . 10 WATTS MAY BE DISSIPATED AT  $40^{\circ}\text{C}$  WHEN A SUITABLE HEAT SINK IS EMPLOYED (STANDARD .040 ALUMINUM  $5" \times 7" \times 2"$  CHASSIS OR EQUIVALENT).
- RESISTANCE-TEMPERATURE CHARACTERISTIC:  $\pm 26 \text{ PPM}/^{\circ}\text{C}$  FROM  $-55^{\circ}\text{C}$  TO  $+275^{\circ}\text{C}$  EXCEPT FOR FRACTIONAL OHM RESISTORS AT THE LOW TEMPERATURES WHICH MAY BE AS HIGH AS  $\pm 60 \text{ PPM}/^{\circ}\text{C}$ .
- LEAD STRENGTH: EACH LEAD SHALL BE CAPABLE OF WITHSTANDING A 4 POUND AXIAL PULL. THEY SHALL ALSO BE CAPABLE OF WITHSTANDING 2 CYCLES OF THE FOLLOWING TEST-WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN THE VERTICAL AXIAL POSITION, BEND THE RESISTOR BODY SMOOTHLY IN A PLANE  $90^{\circ}$  TO ONE SIDE, THEN  $180^{\circ}$  BACK TO THE OPPOSITE EXTREME, THEN  $90^{\circ}$  BACK TO THE ORIGINAL POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

.034 DIA (#20 AWG)  
.030



MOUNTED ON STANDARD .040  
ALUM CHASSIS  $5" \times 7" \times 2"$

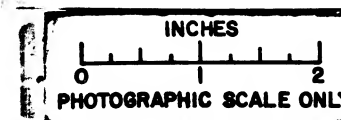


|                           |         |
|---------------------------|---------|
| G                         | G       |
| F                         | F       |
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

(F) REPLACES REV(E) WITH CHANGE

PROCURE ONLY FROM APPROVED SOURCES LISTED ON  
ND 1002034 FOR THIS DRAWING.

|  |                         |  |         |
|--|-------------------------|--|---------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                | FIG NO. |
| LIST OF MATERIALS  |                         |  |         |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.                |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |         |
| DRAWN BY: <i>J. Conboy</i> DATE: <i>8/1/63</i>             |                         | RESISTOR, FIXED, WW                        |         |
| CHECKED BY: <i>Papayich</i> DATE: <i>8/1/63</i>            |                         | SPECIFICATION CONTROL DRAWING              |         |
| APPROVAL BY: <i>Stewart</i> DATE: <i>7/1/63</i>            |                         | NASA DRAWING NO. 1010262                   |         |
| NASA APPROVAL BY: <i>W. J. Harris</i> DATE: <i>9-17-63</i> |                         | CODE IDENT NO.                             | SIZE C  |
| MIT APPROVAL BY: <i>L. V. H. H. 7/1/64</i>                 |                         | SCALE NONE                                 | WT      |
| APPLICATION  |                         | SHEET 1 OF 2                               |         |





NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONFERRING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1010262

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| F         | THIS SHEET ADDED AND UPGRADED TO CLASS A RELEASE PER TDRR 02 09Y | 7/1/63  | dlr      |
| G         | REVISED PER TDRR 07109   | 3/24/64 | WLC      |

D. PER THE REQUIREMENTS OF MIL-R-18546/1 AS MODIFIED HEREIN. CONSTRUCTION: STYLE RE65 MODIFIED PER OUTLINE SHOWN.

4. SPECIAL CONDITIONING BY SUPPLIER:

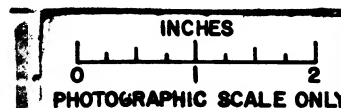
A. BURN-IN: UNITS SHALL BE OPERATED FOR 100 HOURS AT 5.0 WATTS DISSIPATION AND +25°C AMBIENT TEMPERATURE. THE RESISTANCE CHANGE SHALL NOT EXCEED .5% AND THE UNITS SHALL BE WITHIN INITIAL LIMITS.

| DASH NO. | NOMINAL RES-OHMS |
|----------|------------------|
| 1        | 525              |
| 2        | 630              |
| 3        | 272              |
| 4        | 260              |
| 5        | 257              |
| 6        | 250              |
| 7        | 6000             |
| 8        | 662              |

THE COMPLETE PART NUMBER SHALL BE THIS DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

F. THIS SHEET ADDED

|  |                         |  |         |
|--|-------------------------|--|---------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                | FIG NO. |
| LIST OF MATERIALS  |                         |  |         |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>CONTRACT MAS9-497  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |         |
| DRAWN <i>J. P. L.</i> DATE <i>10 JUN 63</i><br>CHECKED <i>P. J. L.</i> DATE <i>19 JUN 63</i><br>APPROVAL <i>W. J. L.</i> DATE <i>7/1/63</i>            |                         | RESISTOR, FIXED, WW                        |         |
| UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>FRACTIONS DECIMALS ANGLES<br>± ± ±<br>DO NOT SCALE THIS DRAWING<br>MATERIAL |                         | SPECIFICATION CONTROL DRAWING              |         |
| HEAT TREATMENT   |                         | NASA DRAWING NO.                           |         |
| FINAL FINISH   |                         | 1010262                                    |         |
| NEXT ASSY  | USED ON                 | CODE IDENT NO. SIZE                        | SCALE   |
| APPLICATION  |                         | C  | WT      |
|  |                         | SHEET 2 OF 2                               |         |





NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY FOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONFERRING ANY RIGHTS OR PERMISSION TO REPRODUCE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THEREBY.

# REQUIREMENTS:

## 1. GENERAL:

- INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH THE GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
- QUALITY ASSURANCE: MANUFACTURER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 2.
- THESE RESISTORS SHALL MEET THE REQUIREMENTS OF MIL-R-18546/1, STYLE REGS, CHARACTERISTIC G, EXCEPT AS SPECIFIED HEREIN.
- PACKAGING: UNITS SHALL BE PACKAGED PER MIL-R-18546, LEVEL A.

## 2. INSPECTION AND ACCEPTANCE:

### A. ELECTRICAL REQUIREMENTS:

- RESISTANCE VALUE: PER TABLE.
- RESISTANCE TOLERANCE, INITIAL:  $\pm 1.0\%$ .

### B. MECHANICAL REQUIREMENTS: THE MANUFACTURER'S NAME OR SYMBOL, THE NASA DRAWING NUMBER, DASH NUMBER (IF ANY), REVISION LETTER, DATE CODE, SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ~~ND 1002034~~ ALSO INDICATE RESISTANCE VALUE AND TOLERANCE, WATTAGE RATING, (5 WATTS) AND A YELLOW DOT TO SIGNIFY BURN-IN COMPLETION. THE MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH CONTAINER SHALL CONTAIN THE NASA PART NUMBER PLUS THE REVISION LETTER.

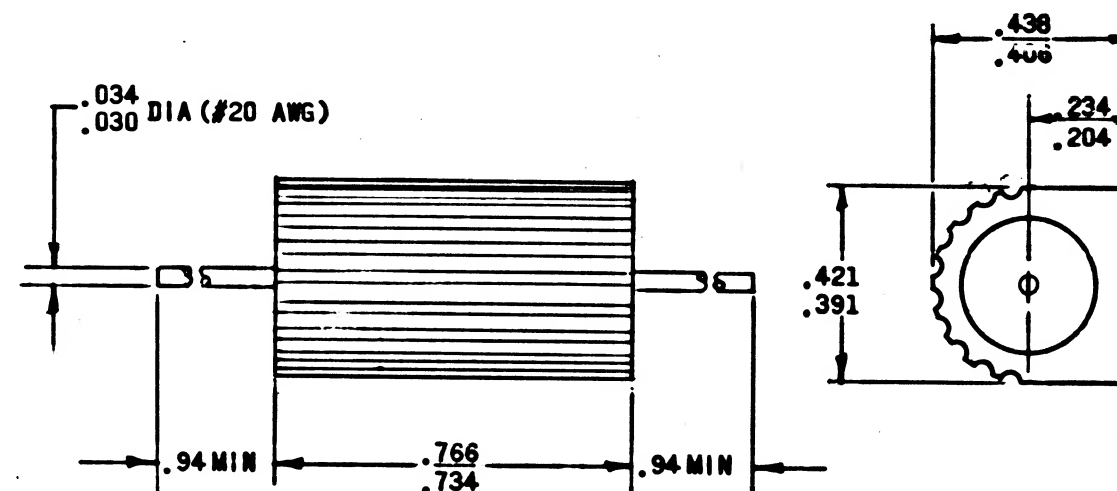
### C. LEAD MATERIAL: PURE NICKEL WELDABLE LEADS IN ACCORDANCE WITH ND 1015400. A CERTIFICATE OF COMPLIANCE TO THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

## 3. DESIGN REQUIREMENTS:

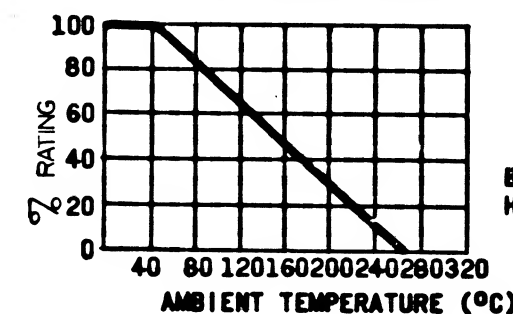
- POWER RATING: 5 WATTS AT  $+25^{\circ}\text{C}$  DERATED TO 3.0 WATTS AT  $+125^{\circ}\text{C}$  AND ZERO WATTS AT  $+275^{\circ}\text{C}$ . 10 WATTS MAY BE DISSIPATED AT  $40^{\circ}\text{C}$  WHEN A SUITABLE HEAT SINK IS EMPLOYED (STANDARD .040 ALUMINUM  $5'' \times 7'' \times 2''$  CHASSIS OR EQUIVALENT).
- RESISTANCE-TEMPERATURE CHARACTERISTIC:  $\pm 26 \text{ PPM}/^{\circ}\text{C}$  FROM  $-55^{\circ}\text{C}$  TO  $+275^{\circ}\text{C}$  EXCEPT FOR FRACTIONAL OHM RESISTORS AT THE LOW TEMPERATURES WHICH MAY BE AS HIGH AS  $\pm 60 \text{ PPM}/^{\circ}\text{C}$ .
- LEAD STRENGTH: EACH LEAD SHALL BE CAPABLE OF WITHSTANDING A 4 POUND AXIAL PULL. THEY SHALL ALSO BE CAPABLE OF WITHSTANDING 2 CYCLES OF THE FOLLOWING TEST-WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN THE VERTICAL AXIAL POSITION, BEND THE RESISTOR BODY SMOOTHLY IN A PLANE  $90^{\circ}$  TO ONE SIDE, THEN  $180^{\circ}$  BACK TO THE OPPOSITE EXTREME, THEN  $90^{\circ}$  BACK TO THE ORIGINAL POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

H 2020101

| REVISIONS |  |        |          |
|-----------|--|--------|----------|
| SYM       | DESCRIPTION  | DATE   | APPROVAL |
| F         | REPLACES REV E WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02094 | 7/1/63 | W.L.     |
| G         | REVISED PER TDRR 07109   | 5/2/64 | W.L.     |
| H         | REVISED PER TDRR 07312   | 3/3/64 | W.L.     |



MOUNTED ON STANDARD .040 ALUM CHASSIS  $5'' \times 7'' \times 2''$



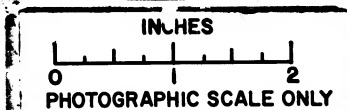
BASED ON  $270^{\circ}\text{C}$  INTERNAL HOT SPOT

|                           |         |
|---------------------------|---------|
| H                         | H       |
| G                         | G       |
| F                         | F       |
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

(F) REPLACES REV(E) WITH CHANGE

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

|   |  |                                    |  |                             |  |         |  |  |  |  |  |  |
|---|--|------------------------------------|--|-----------------------------|--|---------|--|--|--|--|--|--|
| QTY REQD  |  | PART OR IDENTIFYING NO.            |  | NOMENCLATURE OR DESCRIPTION |  | PWD NO. |  |  |  |  |  |  |
| LIST OF MATERIALS   |  |                                    |  |                             |  |         |  |  |  |  |  |  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS  |  |                                    | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |                             |  |         |  |  |  |  |  |  |
| DRAWN <i>[Signature]</i> DATE <i>7-17-63</i>  |  |                                    | RESISTOR, FIXED, WW                        |                             |  |         |  |  |  |  |  |  |
| CHECKED <i>[Signature]</i> DATE <i>7-17-63</i>  |  |                                    | SPECIFICATION CONTROL DRAWING              |                             |  |         |  |  |  |  |  |  |
| APPROVAL <i>[Signature]</i> DATE <i>7-17-63</i>   |  |                                    | NASA DRAWING NO. 1010262                   |                             |  |         |  |  |  |  |  |  |
| MIT APPROVAL <i>[Signature]</i> DATE <i>7-17-63</i>   |  |                                    | SCALE NONE WT SHEET 1 OF 2                 |                             |  |         |  |  |  |  |  |  |
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES $\pm$ $\pm$ $\pm$ |  | DO NOT SCALE THIS DRAWING MATERIAL |  |                             |  |         |  |  |  |  |  |  |
| SEE NOTES   |  | HEAT TREATMENT NONE                |  |                             |  |         |  |  |  |  |  |  |
| NEXT ASSY USED ON   |  | FINAL FINISH NONE                  |  |                             |  |         |  |  |  |  |  |  |
| APPLICATION   |  |                                    |  |                             |  |         |  |  |  |  |  |  |



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D. PER THE REQUIREMENTS OF MIL-R-18546/1 AS MODIFIED HEREIN.  
CONSTRUCTION: STYLE RE65 MODIFIED PER OUTLINE SHOWN.

4. SPECIAL CONDITIONING BY SUPPLIER:

A. BURN-IN: UNITS SHALL BE OPERATED FOR 100 HOURS AT 5.0 WATTS DISSIPATION AND +25°C AMBIENT TEMPERATURE. THE RESISTANCE CHANGE SHALL NOT EXCEED .5% AND THE UNITS SHALL BE WITHIN INITIAL LIMITS.

| DASH NO. | NOMINAL RES-OHMS |
|----------|------------------|
| 1        | 525              |
| 2        | 630              |
| 3        | 272              |
| 4        | 260              |
| 5        | 257              |
| 6        | 250              |
| 7        | 6000             |
| 8        | 662              |
| 9        | 834              |
| 10       | 920              |

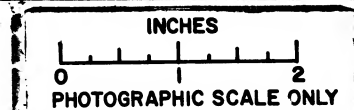
H 2920101

| REVISIONS |   |         |          |
|-----------|---|---------|----------|
| SYM       | DESCRIPTION   | DATE    | APPROVAL |
| F         | THIS SHEET ADDED AND UPGRADED TO CLASS A RELEASE PER TDRR 02094 | 7/1/60  | WHL      |
| G         | REVISED PER TDRR 07109  | 3/2/64  | WHL      |
| H         | REVISED PER TDRR 07312  | 7/31/64 | WHL      |

THE COMPLETE PART NUMBER SHALL BE THIS DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

F THIS SHEET ADDED

|   |                         |  |          |
|---|-------------------------|--|----------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIG. NO. |
| LIST OF MATERIALS   |                         |  |          |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>CONTRACT NAS9-497   |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                                       |          |
| DRAWN <i>J. P. Davis</i> DATE <i>10/11/63</i><br>CHECKED <i>P. J. Davis</i> DATE <i>10/11/63</i><br>APPROVAL <i>W. J. Davis</i> DATE <i>7/1/63</i><br>APPROVAL                  |                         | RESISTOR, FIXED, WW  |          |
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES<br>TOLERANCES ON FRACTIONS DECIMALS ANGLES<br>± ± ±<br>DO NOT SCALE THIS DRAWING MATERIAL<br>HEAT TREATMENT<br>FINAL FINISH |                         | SPECIFICATION CONTROL DRAWING<br>CODE IDENT NO. SIZE<br>NASA DRAWING NO. 1010262 |          |
| NEXT ASSY   | USED ON                 | SCALE  | WT       |
| APPLICATION   |                         | SHEET 2 OF 2   |          |



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# REQUIREMENTS:

## 1. GENERAL:

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- QUALITY ASSURANCE: MANUFACTURER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 2.
- THESE RESISTORS SHALL MEET THE REQUIREMENTS OF MIL-R-18546/1, STYLE RE65, CHARACTERISTIC G, EXCEPT AS SPECIFIED HEREIN.
- PACKAGING: UNITS SHALL BE PACKAGED PER MIL-R-18546, LEVEL A.

## 2. INSPECTION AND ACCEPTANCE:

- ELECTRICAL REQUIREMENTS:
  - RESISTANCE VALUE: PER TABLE.
  - RESISTANCE TOLERANCE, INITIAL:  $\pm 1.0\%$ .
- MECHANICAL REQUIREMENTS: THE MANUFACTURER'S NAME OR SYMBOL, THE NASA DRAWING NUMBER, DASH NUMBER (IF ANY), REVISION LETTER, DATE CODE, SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER "ND1002019". ALSO INDICATE RESISTANCE VALUE AND TOLERANCE, WATTAGE RATING, (5 WATTS) AND A YELLOW DOT TO SIGNIFY BURN-IN COMPLETION. THE MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH CONTAINER SHALL CONTAIN THE NASA PART NUMBER PLUS THE REVISION LETTER.
- LEAD MATERIAL: PURE NICKEL WELDABLE LEADS IN ACCORDANCE WITH ND 1015400. A CERTIFICATE OF COMPLIANCE TO THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

## 3. DESIGN REQUIREMENTS:

- POWER RATING: 5 WATTS AT  $+25^{\circ}\text{C}$  DERATED TO 3.0 WATTS AT  $+125^{\circ}\text{C}$  AND ZERO WATTS AT  $+275^{\circ}\text{C}$ . 10 WATTS MAY BE DISSIPATED AT  $40^{\circ}\text{C}$  WHEN A SUITABLE HEAT SINK IS EMPLOYED (STANDARD .040 ALUMINUM  $5'' \times 7'' \times 2''$  CHASSIS OR EQUIVALENT).
- RESISTANCE-TEMPERATURE CHARACTERISTIC:  $\pm 26 \text{ PPM}/^{\circ}\text{C}$  FROM  $-55^{\circ}\text{C}$  TO  $+275^{\circ}\text{C}$  EXCEPT FOR FRACTIONAL OHM RESISTORS AT THE LOW TEMPERATURES WHICH MAY BE AS HIGH AS  $\pm 60 \text{ PPM}/^{\circ}\text{C}$ .
- LEAD STRENGTH: EACH LEAD SHALL BE CAPABLE OF WITHSTANDING A 4 POUND AXIAL PULL. THEY SHALL ALSO BE CAPABLE OF WITHSTANDING 2 CYCLES OF THE FOLLOWING TEST-WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN THE VERTICAL AXIAL POSITION, BEND THE RESISTOR BODY SMOOTHLY IN A PLANE  $90^{\circ}$  TO ONE SIDE, THEN  $180^{\circ}$  BACK TO THE OPPOSITE EXTREME, THEN  $90^{\circ}$  BACK TO THE ORIGINAL POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

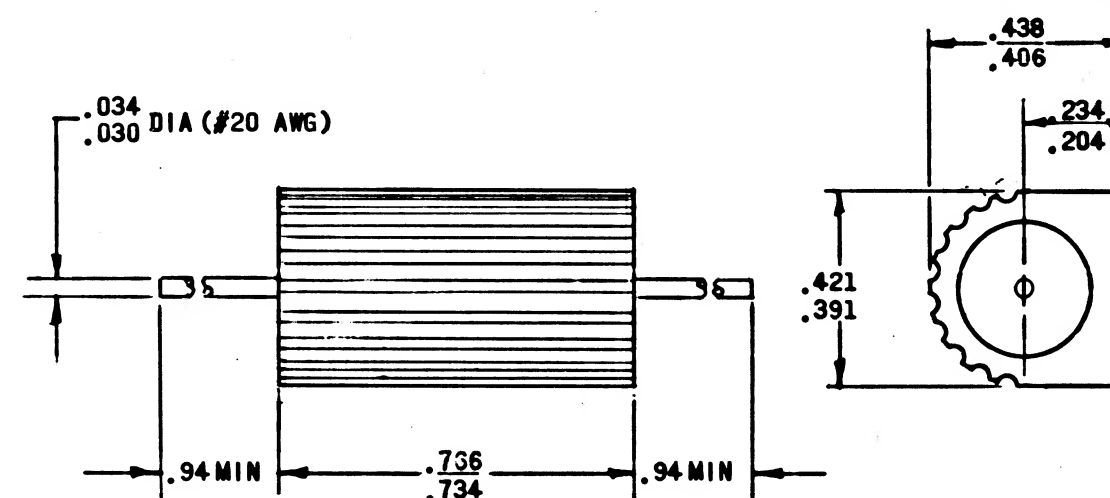
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

Ⓕ REPLACES REV(E) WITH CHANGE

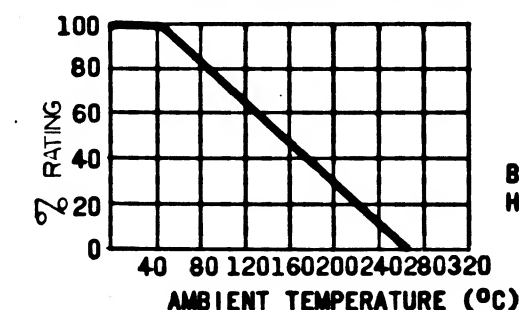
|             |         |  |
|-------------|---------|--|
|             |         | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES |
|             |         | TOLERANCES ON  |
|             |         | FRACTIONS DECIMALS ANGLES                              |
|             |         | $\pm$ $\pm$ $\pm$                                      |
|             |         | DO NOT SCALE THIS DRAWING                              |
|             |         | MATERIAL   |
|             |         | SEE NOTES  |
|             |         | HEAT TREATMENT   |
|             |         | NONE   |
| NEXT ASSY   | USED ON | FINAL FINISH   |
|             |         | NONE   |
| APPLICATION |         |  |

|   |           |  |  |
|---|-----------|--|--|
| MIT<br>INSTRUMENTATION LAB<br>CAMBRIDGE, MASS |           | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |  |
| DWG NO.                                       | CONTRACT  | DATE                                       |  |
| 1002034                                       | NAS9-497  | 18 JUN 63                                  |  |
| DRAWN   | DATE      | CHECKED                                    |  |
| J. Pappas                                     | 18 JUN 63 | Pappas                                     |  |
| APPROVAL                                      | DATE      | APPROVAL                                   |  |
| J. Pappas                                     | 7/1/63    |  |  |
| NASA APPROVAL                                 | DATE      | SCALE                                      |  |
| W. J. Pappas                                  | 7-17-63   | NONE                                       |  |
| MIT APPROVAL                                  | DATE      | WT   |  |
| J. Pappas                                     | 7/1/63    |  |  |

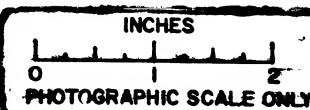
|                     |  |                               |                  |
|---------------------|--|-------------------------------|------------------|
| LIST OF MATERIALS   |  | SPECIFICATION CONTROL DRAWING |                  |
| RESISTOR, FIXED, WW |  | CODE IDENT NO.                | NASA DRAWING NO. |
|                     |  | C                             | 1010262          |
|                     |  | SCALE                         | SHEET 1 OF 2     |
|                     |  | NONE                          |                  |



MOUNTED ON STANDARD .040  
ALUM CHASSIS  $5'' \times 7'' \times 2''$



BASED ON  $270^{\circ}\text{C}$  INTERNAL  
HOT SPOT





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D. PER THE REQUIREMENTS OF MIL-R-18546/1 AS MODIFIED HEREIN.  
CONSTRUCTION: STYLE RE65 MODIFIED PER OUTLINE SHOWN.

4. SPECIAL CONDITIONING BY SUPPLIER:

A. BURN-IN: UNITS SHALL BE OPERATED FOR 100 HOURS AT 5.0 WATTS DISSIPATION AND +25°C AMBIENT TEMPERATURE. THE RESISTANCE CHANGE SHALL NOT EXCEED .5% AND THE UNITS SHALL BE WITHIN INITIAL LIMITS.

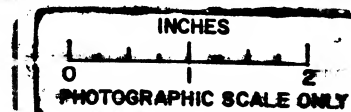
| DASH NO. | NOMINAL RES-OHMS |
|----------|------------------|
| 1        | 525              |
| 2        | 630              |
| 3        | 272              |
| 4        | 260              |
| 5        | 257              |
| 6        | 250              |
| 7        | 6000             |
| 8        | 662              |
| 9        | 834              |
| 10       | 920              |
| 11       | 1690             |
| 12       | 716              |

1010262

| REVISIONS |   |          |          |
|-----------|---|----------|----------|
| SYM       | DESCRIPTION   | DATE     | APPROVAL |
| F         | THIS SHEET ADDED AND UPGRADED TO CLASS A RELEASE PER TDRR 02094 | 7/1/63   | WHL      |
| G         | REVISED PER TDRR 07109  | 3/24/64  | WHL      |
| H         | REVISED PER TDRR 07312  | 2/31/64  | WHL      |
| J         | REVISED PER TDRR 13283  | 10/14/64 | WHL      |

F THIS SHEET ADDED

|  |                         |  |                          |
|--|-------------------------|--|--------------------------|
| QTY REQ  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                | FIG NO.                  |
| LIST OF MATERIALS  |                         |  |                          |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>CONTRACT NAS9-497  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |                          |
| DRAWN BY J. Parks DATE 10 JUN 63<br>CHECKED BY J. Parks DATE 19 JUN 63<br>APPROVED BY J. Parks DATE 7/1/63 |                         | RESISTOR, FIXED, WW                        |                          |
| MATERIAL   |                         | SPECIFICATION CONTROL DRAWING              |                          |
| HEAT TREATMENT   |                         | NASA APPROVAL W. J. White 7-17-63          | CODE IDENT NO. SIZE C    |
| FINAL FINISH   |                         | MIT APPROVAL J. Parks 7/1/63               | NASA DRAWING NO. 1010262 |
| APPLICATION  |                         | SCALE                                      | WT SHEET 2 OF 2          |





NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

#### REQUIREMENTS:

##### 1. GENERAL:

- INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH THE GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
- QUALITY ASSURANCE: MANUFACTURER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 2.
- THESE RESISTORS SHALL MEET THE REQUIREMENTS OF MIL-R-18546/1, STYLE RE65, CHARACTERISTIC G, EXCEPT AS SPECIFIED HEREIN.
- PACKAGING: UNITS SHALL BE PACKAGED PER MIL-R-18546, LEVEL A.

##### 2. INSPECTION AND ACCEPTANCE:

- ELECTRICAL REQUIREMENTS:
  - RESISTANCE VALUE: PER TABLE.
  - RESISTANCE TOLERANCE, INITIAL:  $\pm 1.0\%$ .
- MECHANICAL REQUIREMENTS: THE MANUFACTURER'S NAME OR SYMBOL, THE NASA DRAWING NUMBER, DASH NUMBER (IF ANY), REVISION LETTER, DATE CODE, SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND1002019. ALSO INDICATE RESISTANCE VALUE AND TOLERANCE, WATTAGE RATING, (5 WATTS) AND A YELLOW DOT TO SIGNIFY BURN-IN COMPLETION. THE MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH CONTAINER SHALL CONTAIN THE NASA PART NUMBER PLUS THE REVISION LETTER.
- LEAD MATERIAL: PURE NICKEL WELDABLE LEADS IN ACCORDANCE WITH ND 1015400. A CERTIFICATE OF COMPLIANCE TO THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

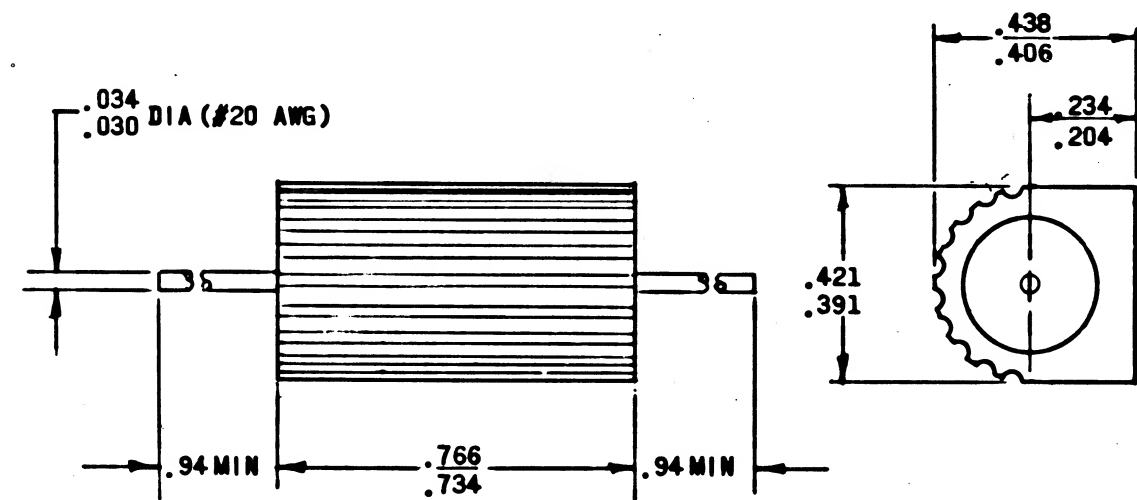
##### 3. DESIGN REQUIREMENTS:

- POWER RATING: 5 WATTS AT  $+25^{\circ}\text{C}$  DERATED TO 3.0 WATTS AT  $+125^{\circ}\text{C}$  AND ZERO WATTS AT  $+275^{\circ}\text{C}$ . 10 WATTS MAY BE DISSIPATED AT  $40^{\circ}\text{C}$  WHEN A SUITABLE HEAT SINK IS EMPLOYED (STANDARD .040 ALUMINUM  $5'' \times 7'' \times 2''$  CHASSIS OR EQUIVALENT).
- RESISTANCE-TEMPERATURE CHARACTERISTIC:  $\pm 26 \text{ PPM}/^{\circ}\text{C}$  FROM  $-55^{\circ}\text{C}$  TO  $+275^{\circ}\text{C}$  EXCEPT FOR FRACTIONAL OHM RESISTORS AT THE LOW TEMPERATURES WHICH MAY BE AS HIGH AS  $\pm 60 \text{ PPM}/^{\circ}\text{C}$ .
- LEAD STRENGTH: EACH LEAD SHALL BE CAPABLE OF WITHSTANDING A 4 POUND AXIAL PULL. THEY SHALL ALSO BE CAPABLE OF WITHSTANDING 2 CYCLES OF THE FOLLOWING TEST-WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN THE VERTICAL AXIAL POSITION, BEND THE RESISTOR BODY SMOOTHLY IN A PLANE  $90^{\circ}$  TO ONE SIDE, THEN  $180^{\circ}$  BACK TO THE OPPOSITE EXTREME, THEN  $90^{\circ}$  BACK TO THE ORIGINAL POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.
- WINDING: NON-INDUCTIVE WOUND

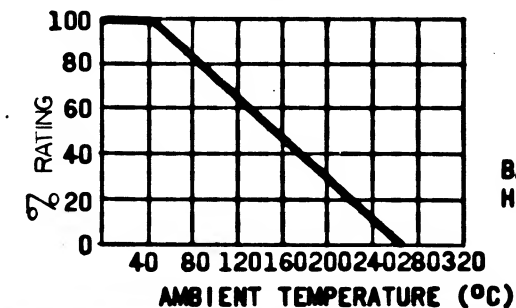
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

2020101

| REVISIONS |  |          |          |
|-----------|--|----------|----------|
| SYM       | DESCRIPTION  | DATE     | APPROVAL |
| F         | REPLACES REV E WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02094 | 7/17/63  | DM       |
| G         | REVISED PER TDRR 07109   | 3/24/64  | WLL      |
| H         | REVISED PER TDRR 07312   | 3/31/64  | WLL      |
| J         | REVISED PER TDRR 13293   | 10/1/64  | WLL      |
| K         | REVISED PER TDRR 24698   | 12/21/65 | WLL      |



MOUNTED ON STANDARD .040 ALUM CHASSIS  $5'' \times 7'' \times 2''$



BASED ON  $270^{\circ}\text{C}$  INTERNAL HOT SPOT

REPLACES REV(E) WITH CHANGE

|   |                         |  |                          |
|---|-------------------------|--|--------------------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                          | FIND NO.                 |
|   |                         |  |                          |
| LIST OF MATERIALS   |                         |  |                          |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>CONTRACT NAS9-497 |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS           |                          |
| DRAWN <i>[Signature]</i> DATE <i>6 JUN 63</i>                   |                         | RESI. OR, FIXED, WW                                  |                          |
| CHECKED <i>[Signature]</i> DATE <i>7/17/63</i>                  |                         |  |                          |
| APPROVAL <i>[Signature]</i> DATE <i>7/17/63</i>                 |                         |  |                          |
| SEE NOTES   |                         | SPECIFICATION CONTROL DRAWING                        |                          |
| HEAT TREATMENT NONE   |                         | NASA APPROVAL <i>[Signature]</i> DATE <i>9-17-63</i> | CODE IDENT NO. 80230     |
| FINAL FINISH NONE   |                         | MIT APPROVAL <i>[Signature]</i> DATE <i>7/17/63</i>  | SIZE C                   |
| APPLICATION   |                         | SCALE NONE   | NASA DRAWING NO. 1010262 |
|   |                         | WT   | SHEET 1 OF 2             |

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D. PER THE REQUIREMENTS OF MIL-R-18546/1 AS MODIFIED HEREIN. CONSTRUCTION: STYLE RE65 MODIFIED PER OUTLINE SHOWN.

4. SPECIAL CONDITIONING BY SUPPLIER:

A. BURN-IN: UNITS SHALL BE OPERATED FOR 100 HOURS AT 5.0 WATTS DISSIPATION AND +25°C AMBIENT TEMPERATURE. THE RESISTANCE CHANGE SHALL NOT EXCEED .5% AND THE UNITS SHALL BE WITHIN INITIAL LIMITS.

| DASH NO. | NOMINAL RES-OHMS |
|----------|------------------|
| 1        | 525              |
| 2        | 630              |
| 3        | 272              |
| 4        | 260              |
| 5        | 257              |
| 6        | 250              |
| 7        | 6000             |
| 8        | 662              |
| 9        | 834              |
| 10       | 920              |
| 11       | 1690             |
| 12       | 716              |

K 2920101

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| F         | THIS SHEET ADDED AND UPGRADED TO CLASS A RELEASE PER TDRR 02 094 | 7/17/63 | WLL      |
| G         | REVISED PER TDRR 07109   | 3/24/64 | WLL      |
| H         | REVISED PER TDRR 07312   | 3/31/64 | WLL      |
| J         | REVISED PER TDRR 13283   | 10/1/64 | WLL      |
| K         | REVISED PER TDRR 24698   | 11/1/64 | WLL      |

F THIS SHEET ADDED

|   |  |  |                                |                             |
|---|--|--|--------------------------------|-----------------------------|
| QTY REQ   |  | PART OR IDENTIFYING NO.                    | NOMENCLATURE OR DESCRIPTION    | FIND NO.                    |
| LIST OF MATERIALS   |  |  |                                |                             |
| MIT STRUMENTATION LAB<br>CAMBRIDGE, MASS<br>CONTRACT NAS9-497 |  | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |                                |                             |
| DRAW BY <i>P. Barba</i> DATE <i>10 JUN 63</i>                 |  | RESISTOR, FIXED, WW                        |                                |                             |
| CHECK BY <i>P. Barba</i> DATE <i>19 JUN 63</i>                |  | SPECIFICATION CONTROL DRAWING              |                                |                             |
| APPR BY <i>W. J. Rhine</i> DATE <i>7-17-63</i>                |  | NASA APPROVAL                              | CODE IDENT NO. SIZE<br>80230 C | NASA DRAWING NO.<br>1010262 |
| MIT APPROVAL <i>J. N. H. 7/17/63</i>                          |  | SCALE                                      | WT                             | SHEET 2 OF 2                |

|   |                |              |
|---|----------------|--------------|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ± | HEAT TREATMENT | FINAL FINISH |
| DO NOT SCALE THIS DRAWING   |                |              |
| MATERIAL  |                |              |
| NEXT ASSY   | USED ON        | APPLICATION  |

Graph showing the relationship between Ambient Temperature (°C) and the Hot Spot Temperature of the 275° Internal Mounting. The Hot Spot Temperature decreases linearly as Ambient Temperature increases.

| Ambient Temperature (°C) | Hot Spot Temperature (°C) |
|--------------------------|---------------------------|
| 40                       | 100                       |
| 80                       | 80                        |
| 120                      | 60                        |
| 160                      | 40                        |
| 200                      | 20                        |
| 240                      | 0                         |

Technical drawing of a mechanical part. The drawing includes a side view and a cross-sectional view. The side view shows a central cylindrical body with a diameter of .380 and a tolerance of .370. The length of the central body is .500 MAX. The length of the two end sections is 1.062 MIN. The end sections have a diameter of .032 NOM DIA. The cross-sectional view shows a circular profile with a diameter of .250 MAX DIA. The drawing is labeled with dimensions and tolerances.



INCHES

0 1 2

PHOTOGRAPHIC SCALE ONLY

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#### REQUIREMENTS:

##### GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: GOLD PLATED IRON-NICKEL ALLOY (DUMET) PER NASA DOCUMENT 1015401.  
A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

ELECTRICAL CHARACTERISTICS: PER TABLE II.

ZENER VOLTAGE ( $V_Z$ )

ZENER IMPEDANCE ( $Z_{ZT}$ )

MARKING: THE MANUFACTURER'S NAME, TRADEMARK, OR CODE, TYPE DESIGNATION, DATE CODE, LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, PER MIL-STD-130.

##### GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE:  $-65^{\circ}\text{C}$  TO  $+150^{\circ}\text{C}$

ELECTRICAL RATING: PER TABLE I

TOLERANCE:  $\pm 5\%$

ELECTRICAL SPECIFICATION: PER TABLE II.

POWER DISSIPATION: 750 MILLIWATTS MAX DERATED AT  $6\text{ MW}/^{\circ}\text{C}$ .

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002034.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER NASA DOCUMENT 1015404, CLASS 1.

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491 LEVEL A IN BOTH INSTANCES.

(1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

##### GROUP III (SPECIAL CONDITIONING BY SUPPLIER):

BURN IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

1. AMBIENT TEMPERATURE:  $100^{\circ}\text{C} \pm 0^{\circ}\text{C}$
2. POWER DISSIPATION: 50% OF  $100^{\circ}\text{C}$  CASE TEMPERATURE RATING

DIODES WHICH FAIL TO MEET ALL INITIAL MEASUREMENTS AND THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN IN SHALL NOT BE ACCEPTABLE.

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS

PRIOR TO AND FOLLOWING BURN IN:

1. ZENER VOLTAGE ( $V_Z$ )
2. DYNAMIC IMPEDANCE ( $Z_{ZT}$ )

PARAMETRIC CHANGE LIMITS:

1. ZENER VOLTAGE:  $\pm 1\%$  OF INITIAL VALUE
2. DYNAMIC IMPEDANCE:  $\pm 5\%$  OF INITIAL VALUE

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING.

1010263

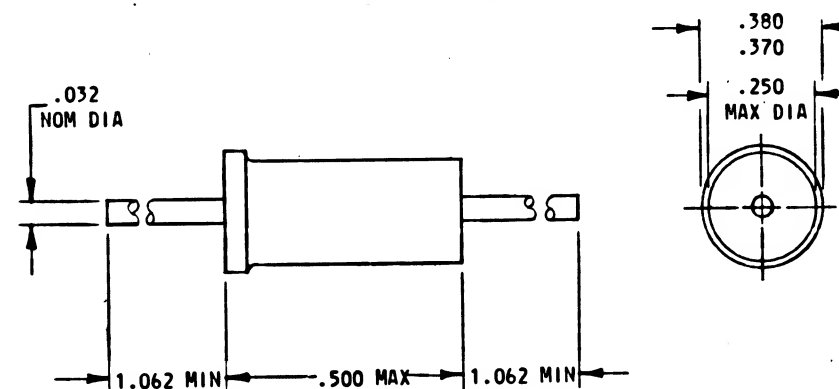
| REVISIONS |             |      |          |
|-----------|-------------|------|----------|
| SYM       | DESCRIPTION | DATE | APPROVAL |
| -         |             |      |          |

## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00497

DATE

3-6-63



|                           |         |
|---------------------------|---------|
|                           |         |
|                           |         |
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

MASTER

|             |         |   |
|-------------|---------|---|
|             |         | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>FRACTIONS DECIMALS ANGLES<br>$\pm$ $\pm$ $\pm$<br>DO NOT SCALE THIS DRAWING<br>MATERIAL<br>SEE NOTES<br>HEAT TREATMENT<br>NONE<br>FINAL FINISH<br>NONE |
| NEXT ASSY   | USED ON |   |
| APPLICATION |         |   |

|         |   |  |                             |
|---------|---|--|-----------------------------|
| QTY REQ | PART OR IDENTIFYING NO.   | NOMENCLATURE OR DESCRIPTION  | FIND NO.                    |
|         |   | LIST OF MATERIALS  |                             |
|         | MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.<br>DWS. NO. CONTRACT  | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                         |                             |
|         | DRAWN BY <i>Bergman</i> DATE 3/26/62<br>CHECKED <i>Bergman</i> DATE 4/1/62<br>APPROVAL <i>Bergman</i> 3/26/62 | SEMICONDUCTOR DEVICE, DIODE, (VR)<br>SPECIFICATION CONTROL DRAWING |                             |
|         | NASA APPROVAL <i>Bergman</i><br>MIT APPROVAL <i>Bergman</i> 3/26/62   | CODE IDENT NO. SIZE<br>C   | NASA DRAWING NO.<br>1010263 |
|         |   | SCALE NONE WT  | SHEET 1 OF 2                |

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TABLE I

| MAXIMUM RATINGS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) |   |                             |                            |
|--|---|-----------------------------|----------------------------|
| ZENER<br>CURRENT<br>(I <sub>ZM</sub> )                                     | ZENER<br>CURRENT<br>AT T <sub>A</sub> = 125°C | POWER<br>DISSIPATION<br>(P) | ETA<br>TYPE<br>DESIGNATION |
| MADC   | MADC  | MW                          |                            |
| 40   | 8   | 750                         | 1N2038-1                   |

TABLE II

| ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) |                         |          |                      |       |       |
|---|-------------------------|----------|----------------------|-------|-------|
| PARAMETER   | CONDITIONS              | SYMBOL   | SPECIFICATION LIMITS |       |       |
|   |                         |          | MIN                  | MAX   | UNITS |
| ZENER VOLTAGE   | $I_{ZT} = 5 \text{ MA}$ | $V_Z$    | 14.25                | 15.75 | VOLTS |
| ZENER IMPEDANCE   | $I_{ZT} = 5 \text{ MA}$ | $Z_{ZT}$ | -                    | 120   | OHMS  |

**FOR INFORMATION ONLY**

CLASS B RELEASE TDR No. 00497 DATE 3-6-63

# MASTERED

|             |         |
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| NEXT ASSY   | USED ON |
| APPLICATION |         |

|                            |          |        |  |
|----------------------------|----------|--------|--|
| UNLESS OTHERWISE SPECIFIED |          |        |  |
| DIMENSIONS ARE IN INCHES   |          |        |  |
| TOLERANCES ON              |          |        |  |
| FRACTIONS                  | DECIMALS | ANGLES |  |
| $\pm$                      | $\pm$    | $\pm$  |  |
| <hr/>                      | <hr/>    | <hr/>  |  |
| DO NOT SCALE THIS DRAWING  |          |        |  |
| MATERIAL                   |          |        |  |
| SEE NOTES                  |          |        |  |
| HEAT TREATMENT             |          |        |  |
| NONE                       |          |        |  |
| FINAL FINISH               |          |        |  |
| NONE                       |          |        |  |

|  |                            |  |                  |                                    |
|--|----------------------------|--|------------------|------------------------------------|
| QTY<br>REQD                                    | PART OR<br>IDENTIFYING NO. | NOMENCLATURE OR<br>DESCRIPTION             |                  | FIN<br>NO.                         |
| LIST OF MATERIALS                              |                            |  |                  |                                    |
| MIT<br>INSTRUMENTATION LAB<br>CAMBRIDGE, MASS. |                            | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |                  |                                    |
| DWG. NO. _____ CONTRACT _____                  |                            |  |                  |                                    |
| DRAWN <i>D. Ferguson</i> DATE <i>2 Dec 62</i>  |                            | SEMICONDUCTOR DEVICE, DIODE, (VR)          |                  |                                    |
| CHECKED <i>James H. H.</i> <i>19 Feb 63</i>    |                            |  |                  |                                    |
| APPROVAL <i>[Signature]</i> <i>3/6/63</i>      |                            |  |                  |                                    |
| APPROVAL _____                                 |                            |  |                  |                                    |
| NASA APPROVAL <i>[Signature]</i>               |                            | CODE IDENT NO.                             | SIZE<br><b>C</b> | NASA DRAWING NO.<br><b>1010263</b> |
| MIT APPROVAL <i>[Signature]</i>                |                            | SCALE <b>NONE</b>                          | WT               | SHEET <b>2</b> OF <b>2</b>         |

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#### NOTES:

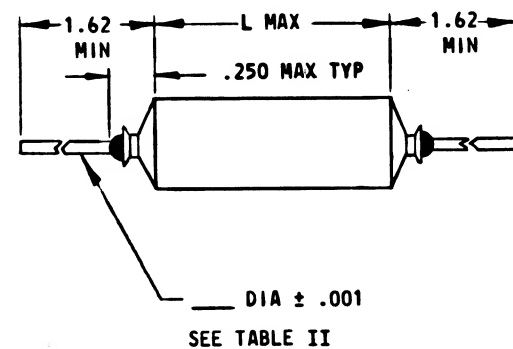
##### 1. REQUIREMENTS:

- A. RATINGS: CONTINUOUS WORKING VOLTAGE AT 125°C; SEE TABLE I  
MAXIMUM CURRENT; 1 AMPERE  
OPERATING TEMPERATURE RANGE; -55 TO +125°C
- B. INSULATION RESISTANCE:  
AT 25°C; INSULATION RESISTANCE X CAPACITANCE = 2000 MEGOHM - MICROFARADS MINIMUM UP TO A PERMISSIBLE MAXIMUM OF 12,000 MEGOHMS INSULATION RESISTANCE. 3000 MEGOHMS MINIMUM BETWEEN CASE AND EITHER TERMINAL.  
AT 125°C; INSULATION RESISTANCE X CAPACITANCE = 10 MEGOHM-MICROFARADS (200 VDC) OR 40 MEGOHM - MICROFARADS (400 OR 600 VDC) MINIMUM UP TO A PERMISSIBLE MAXIMUM OF 150 MEGOHMS (200 VDC) OR 600 MEGOHMS (400 OR 600 VDC) INSULATION RESISTANCE.
- C. POWER FACTOR: 1% MAXIMUM FOR CASE SIZES D THRU U (SEE TABLE II) AND 1.5% MAXIMUM FOR SIZES A, B, AND C.
- D. CONSTRUCTION: PARTS SHALL BE CONSTRUCTED FROM METALIZED PAPER AND A MINERAL WAX IMPREGNATED POLYESTER FILM. THE CASE SHALL BE OF METAL AND SEALED. CONNECTIONS SHALL BE SUCH THAT THE PARTS SHALL BE ESSENTIALLY NON-INDUCTIVE.
- E. LEAD MATERIAL: LEADS SHALL BE PURE NICKEL IN ACCORDANCE WITH ND 1015400.
- F. LEAD STRENGTH: LEADS SHALL WITHSTAND A 5 POUND AXIAL PULL FOR 1 MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.
- G. ENVIRONMENTAL TESTS: CAPACITORS SHALL BE CAPABLE OF MEETING ALL ENVIRONMENTAL REQUIREMENTS OF MIL-C-25, ND 1002029.
- H. MARKING: EACH CAPACITOR SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL AND PART NUMBER, CAPACITANCE VALUE, TOLERANCE, AND VOLTAGE RATING. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING AND DASH NUMBER TOGETHER WITH THE REVISION.
- J. QUALITY ASSURANCE: SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS II IN ADDITION TO THIS DRAWING AND MIL-C-25.
2. INTERPRET THIS DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.
3. NOTE - WHEN ORDERING PARTS, SPECIFY MANUFACTURER PART NUMBER PLUS NICKEL LEADS IN ACCORDANCE WITH ND 1015400.
4. A WAIVE AS REQUIRED ALL INFORMATION PRESENTED ON THIS DRAWING EXCEPT LEAD MATERIAL SPEC. & PHYSICAL DIMENSIONS.  
B UPON SPECIFIC INSTRUCTION BY (TD) TECHNICAL DIRECTIVE PROCURE THIS PART AS CHANGE LETTER A BY ORDERING TO VENDOR CATALOG NO. & SPECIFICATIONS. REFERENCE ND 1002034.  
C DISREGARD THIS NOTE IN ITS ENTIRETY IF REFERENCE IS MADE TO THIS DRAWING BY OTHER THAN REVISION LETTER A.

#### ORIGINAL SOURCE OF SUPPLY:

SPRAGUE ELECTRIC CO.  
NO. ADAMS, MASS.  
CODE IDENT NO. 56289

|             |         |  |
|-------------|---------|--|
|             |         | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES |
|             |         | TOLERANCES ON  |
|             |         | FRACTIONS DECIMALS ANGLES                              |
|             |         | $\pm$ $\pm$ $\pm$                                      |
|             |         | DO NOT SCALE THIS DRAWING                              |
|             |         | MATERIAL   |
|             |         | SEE NOTES  |
|             |         | HEAT TREATMENT   |
|             |         | NONE   |
| NEXT ASSY   | USED ON | FINAL FINISH   |
|             |         | NONE   |
| APPLICATION |         |  |



1010264

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION                              | DATE    | APPROVAL |
| -         | ORIGINATED                               |         |          |
| A         | ADDED PROCUREMENT NOTE 4 PER TDRR. 00433 | 2-20-63 | WJH      |

## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00295 DATE 23 Jan 1963

| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  |                  | FIND NO.                           |
|---|-------------------------|--|------------------|------------------------------------|
| LIST OF MATERIALS                                   |                         |  |                  |                                    |
| MIT<br>INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.      |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                                     |                  |                                    |
| DWG. NO. _____ CONTRACT _____                       |                         | CAPACITOR FIXED,<br>METALIZED PAPER PLUS FILM<br>SPECIFICATION CONTROL DRAWING |                  |                                    |
| DRAWN <i>[Signature]</i> DATE <i>9 Jan 63</i>       |                         |  |                  |                                    |
| CHECKED <i>[Signature]</i> DATE <i>9 Jan 63</i>     |                         |  |                  |                                    |
| APPROVAL <i>[Signature]</i> DATE <i>23 Jan 63</i>   |                         |  |                  |                                    |
| APPROVAL _____                                      |                         |  |                  |                                    |
| NASA APPROVAL <i>[Signature]</i><br><i>1-23-63</i>  |                         | CODE IDENT NO.   | SIZE<br><b>C</b> | NASA DRAWING NO.<br><b>1010264</b> |
| MIT APPROVAL <i>[Signature]</i><br><i>23 Jan 63</i> |                         | SCALE <b>NONE</b>  | WT               | SHEET <b>1</b> OF <b>2</b>         |



NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

#### NOTES:

#### 1. REQUIREMENTS:

A. RATINGS: CONTINUOUS WORKING VOLTAGE AT 125°C; SEE TABLE I  
MAXIMUM CURRENT: 1 AMPERE  
OPERATING TEMPERATURE RANGE: -55 TO +125°C

#### B. INSULATION RESISTANCE:

AT 25°C: INSULATION RESISTANCE X CAPACITANCE = 2000 MEGOHM - MICROFARADS MINIMUM UP TO A PERMISSIBLE MAXIMUM OF 12,000 MEGOHMS INSULATION RESISTANCE. 3000 MEGOHMS MINIMUM BETWEEN CASE AND EITHER TERMINAL.

AT 125°C: INSULATION RESISTANCE X CAPACITANCE = 10 MEGOHM-MICROFARADS (200 VDC) OR 40 MEGOHM - MICROFARADS (400 OR 600 VDC) MINIMUM UP TO A PERMISSIBLE MAXIMUM OF 150 MEGOHMS (200 VDC) OR 600 MEGOHMS (400 OR 600 VDC) INSULATION RESISTANCE.

C. POWER FACTOR: 1% MAXIMUM FOR CASE SIZES D THRU U (SEE TABLE II) AND 1.5% MAXIMUM FOR SIZES A, B, AND C.

D. CONSTRUCTION: PARTS SHALL BE CONSTRUCTED FROM METALIZED PAPER AND A MINERAL WAX IMPREGNATED POLYESTER FILM. THE CASE SHALL BE OF METAL AND SEALED. CONNECTIONS SHALL BE SUCH THAT THE PARTS SHALL BE ESSENTIALLY NON-INDUCTIVE.

E. LEAD MATERIAL: LEADS SHALL BE PURE NICKEL IN ACCORDANCE WITH ND 1015400.

F. LEAD STRENGTH: LEADS SHALL WITHSTAND A 5 POUND AXIAL PULL FOR 1 MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

G. ENVIRONMENTAL TESTS: CAPACITORS SHALL BE CAPABLE OF MEETING ALL ENVIRONMENTAL REQUIREMENTS OF MIL-C-25, AND ND 1002000.

H. MARKING: EACH CAPACITOR SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL AND PART NUMBER, CAPACITANCE VALUE, TOLERANCE, AND VOLTAGE RATING. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING AND DASH NUMBER TOGETHER WITH THE REVISION.

J. QUALITY ASSURANCE: SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS II IN ADDITION TO THIS DRAWING AND MIL-D-25.

2. INTERPRET THIS DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

3. NOTE - WHEN ORDERING PARTS, SPECIFY MANUFACTURER PART NUMBER PLUS NICKEL LEADS IN ACCORDANCE WITH ND 1015400.

4 A WAIVE AS REQUIRED ALL INFORMATION PRESENTED ON THIS DRAWING EXCEPT LEAD MATERIAL SPEC. & PHYSICAL DIMENSIONS.

B UPON SPECIFIC INSTRUCTION BY (TD) TECHNICAL DIRECTIVE PROCURE THIS PART AS CHANGE LETTER A BY ORDERING TO VENDOR CATALOG NO. & SPECIFICATIONS. REFERENCE ND 1002034.

C DISREGARD THIS NOTE IN ITS ENTIRETY IF REFERENCE IS MADE TO THIS DRAWING BY OTHER THAN REVISION LETTER A.

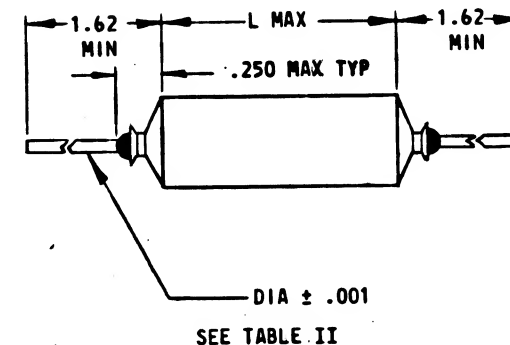
#### ORIGINAL SOURCE OF SUPPLY:

SPRAGUE ELECTRIC CO.  
NO. ADAMS, MASS.  
CODE IDENT NO. 56289

MASTER

|             |         |  |
|-------------|---------|--|
|             |         | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES |
|             |         | TOLERANCES ON  |
|             |         | FRACTIONS DECIMALS ANGLES                              |
|             |         | $\pm$ $\pm$ $\pm$                                      |
|             |         | DO NOT SCALE THIS DRAWING                              |
|             |         | MATERIAL   |
|             |         | SEE NOTES  |
|             |         | HEAT TREATMENT   |
|             |         | NONE   |
| NEXT ASSY   | USED ON | FINAL FINISH   |
|             |         | NONE   |
| APPLICATION |         |  |

|          |  |  |                          |
|----------|--|--|--------------------------|
| QTY REQD | PART OR IDENTIFYING NO.                          | NOMENCLATURE OR DESCRIPTION                    | FIND NO.                 |
|          |  | LIST OF MATERIALS                              |                          |
|          | MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.      | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS     |                          |
|          | DWG. NO. <i>1010264</i> CONTRACT <i>1010264</i>  |  |                          |
|          | DRAWN <i>[Signature]</i> DATE <i>9 Jan 63</i>    | CAPACITOR, FIXED,<br>METALIZED PAPER PLUS FILM |                          |
|          | CHECKED <i>[Signature]</i> DATE <i>28 Jan 63</i> | SPECIFICATION CONTROL DRAWING                  |                          |
|          | APPROVAL <i>[Signature]</i>                      |  |                          |
|          | NASA APPROVAL <i>[Signature]</i> 1-23-63         | CODE IDENT NO. <i>C</i> SIZE <i>C</i>          | NASA DRAWING NO. 1010264 |
|          | MIT APPROVAL <i>[Signature]</i> 23 Jan 63        | SCALE NONE WT                                  | SHEET 1 OF 2             |



## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00295 DATE 23 Jan 1963

ⓑ REPLACED WITH CHANGE BY  
REV C

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#### NOTES:

##### 1. REQUIREMENTS:

- A. RATINGS: CONTINUOUS WORKING VOLTAGE AT 125°C; SEE TABLE I  
MAXIMUM CURRENT; 1 AMPERE  
OPERATING TEMPERATURE RANGE; -55 TO +125°C
- B. INSULATION RESISTANCE:  
AT 25°C; INSULATION RESISTANCE X CAPACITANCE = 2000 MEGOHM - MICROFARADS MINIMUM UP TO A PERMISSIBLE MAXIMUM OF 12,000 MEGOHMS INSULATION RESISTANCE. 3000 MEGOHMS MINIMUM BETWEEN CASE AND EITHER TERMINAL.  
AT 125°C; INSULATION RESISTANCE X CAPACITANCE = 10 MEGOHM-MICROFARADS (200 VDC) OR 40 MEGOHM - MICROFARADS (400 OR 600 VDC) MINIMUM UP TO A PERMISSIBLE MAXIMUM OF 150 MEGOHMS (200 VDC) OR 600 MEGOHMS (400 OR 600 VDC) INSULATION RESISTANCE.
- C. POWER FACTOR: 1% MAXIMUM FOR CASE SIZES D THRU U (SEE TABLE II) AND 1.5% MAXIMUM FOR SIZES A, B, AND C.
- D. CONSTRUCTION: PARTS SHALL BE CONSTRUCTED FROM METALIZED PAPER AND A MINERAL WAX IMPREGNATED POLYESTER FILM. THE CASE SHALL BE OF METAL AND SEALED. CONNECTIONS SHALL BE SUCH THAT THE PARTS SHALL BE ESSENTIALLY NON-INDUCTIVE.
- E. LEAD MATERIAL: LEADS SHALL BE PURE NICKEL IN ACCORDANCE WITH ND 1015400.
- F. LEAD STRENGTH: LEADS SHALL WITHSTAND A 5 POUND AXIAL PULL FOR 1 MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.
- G. ENVIRONMENTAL TESTS: CAPACITORS SHALL BE CAPABLE OF MEETING ALL ENVIRONMENTAL REQUIREMENTS OF MIL-C-25.
- H. MARKING: EACH CAPACITOR SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL AND PART NUMBER, CAPACITANCE VALUE, TOLERANCE, AND VOLTAGE RATING. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING AND DASH NUMBER TOGETHER WITH THE REVISION.
- J. QUALITY ASSURANCE: SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS II IN ADDITION TO THIS DRAWING AND MIL-C-25.
2. INTERPRET THIS DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.
3. NOTE - WHEN ORDERING PARTS, SPECIFY MANUFACTURER PART NUMBER PLUS NICKEL LEADS IN ACCORDANCE WITH ND 1015400.

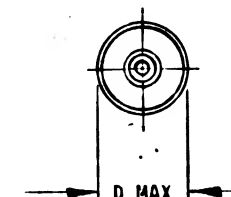
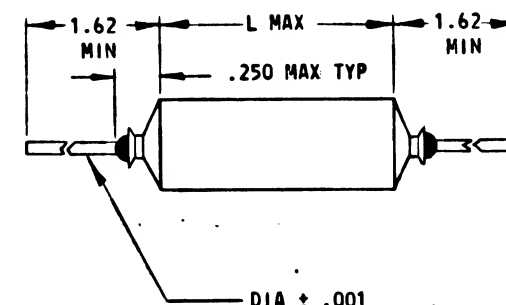
#### ORIGINAL SOURCE OF SUPPLY:

SPRAGUE ELECTRIC CO.  
NO. ADAMS, MASS.  
CODE IDENT NO. 56289

MASTER

|             |         |  |          |        |
|-------------|---------|--|----------|--------|
|             |         | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES |          |        |
|             |         | TOLERANCES ON  |          |        |
|             |         | FRACTIONS  | DECIMALS | ANGLES |
|             |         | ±  | ±        | ±      |
|             |         | DO NOT SCALE THIS DRAWING                              |          |        |
|             |         | MATERIAL   |          |        |
|             |         | SEE NOTES  |          |        |
|             |         | HEAT TREATMENT   |          |        |
|             |         | NONE   |          |        |
|             |         | FINAL FINISH   |          |        |
|             |         | NONE   |          |        |
| NEXT ASSY   | USED ON |  |          |        |
| APPLICATION |         |  |          |        |

|  |                         |  |          |
|--|-------------------------|--|----------|
| QTY REQD                                       | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                    | FIND NO. |
| LIST OF MATERIALS                              |                         |  |          |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.    |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS     |          |
| DWS NO. <i>1-23-63</i> CONTRACT <i>28101</i>   |                         | CAPACITOR, FIXED,<br>METALIZED PAPER PLUS FILM |          |
| DRAWN <i>W. J. Miller</i> DATE <i>9 Jan 63</i> |                         | SPECIFICATION CONTROL DRAWING                  |          |
| CHECKED <i>W. J. Miller</i> 9 Jan 63           |                         |  |          |
| APPROVAL <i>W. J. Miller</i> 23 Jan 63         |                         |  |          |
| APPROVAL                                       |                         |  |          |
| NASA APPROVAL <i>W. J. Miller</i> 1-23-63      |                         | CODE IDENT NO.                                 | SIZE     |
| MIT APPROVAL <i>W. J. Miller</i> 23 Jan 63     |                         |  | C        |
|  |                         | NASA DRAWING NO.                               | 1010264  |
|  |                         | SCALE  | NONE     |
|  |                         | WT   |          |
|  |                         | SHEET  | 1 OF 2   |



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CLASS B RELEASE TDR No. 00295 DATE 23 Jan 1963

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#### ORIGINAL SOURCE OF SUPPLY:

SPRAGUE ELECTRIC CO.  
NO. ADAMS, MASS.  
CODE IDENT NO. 56289

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| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

MASTER

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|             |         | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON |
|             |         | FRACTIONS DECIMALS ANGLES   |
|             |         | $\pm$ $\pm$ $\pm$   |
|             |         | DO NOT SCALE THIS DRAWING   |
|             |         | MATERIAL  |
|             |         | SEE NOTES   |
|             |         | HEAT TREATMENT  |
|             |         | NONE  |
|             |         | FINAL FINISH  |
|             |         | NONE  |
| NEXT ASSY   | USED ON |   |
| APPLICATION |         |   |

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| MIT<br>INSTRUMENTATION LAB<br>CAMBRIDGE, MASS. |          | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS |      |
| DWG NO.  | CONTRACT | DRAWN                                      | DATE |
| CHECKED  | DATE     | APPROVAL                                   | DATE |
| APPROVAL                                       | DATE     | APPROVAL                                   | DATE |
| NASA APPROVAL                                  | DATE     | CODE IDENT NO.                             | SIZE |
| MIT APPROVAL                                   | DATE     | 1010264                                    | C    |
| SCALE  |          | NONE                                       | WT   |
|  |          | SHEET 1                                    | OF 2 |

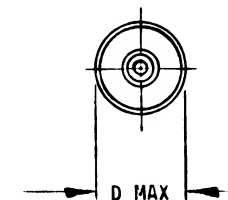
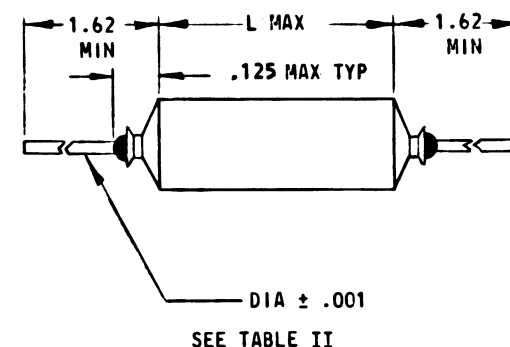
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1010264

| REVISIONS |  |        |          |
|-----------|--|--------|----------|
| SYM       | DESCRIPTION                                  | DATE   | APPROVAL |
| C         | REPLACES REV B WITH<br>CHANGE PER TDRR 00513 | -      | WHL      |
| D         | REVISED PER TDRR 00872                       | 174/63 | WHL      |

## FOR INFORMATION ONLY

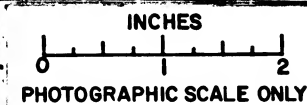
CLASS B RELEASE TDR No. 00295 DATE  
23 Jan 1963



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| 4  |          |                             |            | 3   |                             |            |          | 2                           |            |  |  | 1                                    |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
|--|----------|-----------------------------|------------|---|-----------------------------|------------|----------|-----------------------------|------------|--|--|--------------------------------------|---------|--|--|---------|--|--|---------|--|--|----------|-----------------------------|------------|----------|-----------------------------|------------|----------|-----------------------------|------------|-------|----|-------------|---|-----|-----|-----|-----|-------------|---|-------|----|-------------|---|-----|-----|-----|-----|-------------|---|-------|----|-------------|---|-----|-----|-----|-----|-------------|---|-------|----|-------------|---|-----|-----|-----|-----|-------------|---|-------|----|-------------|---|-----|-----|-----|-----|-------------|---|-------|----|-------------|---|-----|-----|-----|-----|-------------|---|-------|----|-------------|---|-----|-----|-----|-----|-------------|---|-------|----|-------------|---|-----|-----|-----|-----|-------------|---|-------|----|-------------|---|-----|-----|-----|-----|-------------|---|-------|-----|-------------|---|-----|-----|-----|-----|-------------|---|-------|-----|-------------|---|-----|-----|-----|-----|-------------|---|-------|-----|-------------|---|-----|-----|-----|-----|-------------|---|------|-----|-------------|---|-----|-------------|-----|-----|-------------|---|------|-----|-------------|---|-----|-------------|-----|-----|-------------|---|------|-----|-------------|---|-----|-------------|-----|-----|-------------|---|------|-----|-------------|---|-----|-------------|---|-----|-------------|---|------|-----|-------------|---|-----|-------------|---|-----|-------------|---|------|-----|-------------|---|-----|-------------|-----|-----|-------------|---|------|-----|-------------|---|-----|-------------|-----|-----|-------------|---|------|-----|-------------|---|-----|-------------|-----|-----|-------------|---|------|-----|-------------|---|-----|-------------|-----|-----|-------------|---|------|-----|-------------|---|-----|-------------|-----|-----|-------------|---|------|-----|-------------|---|-----|-------------|-----|-----|-------------|---|------|-----|-------------|---|-----|-------------|-----|-----|-------------|---|------|-----|-------------|---|-----|-------------|-----|-----|-------------|---|------|-----|-------------|---|-----|-------------|---|------|-------------|---|------|-----|-------------|---|-----|-------------|---|------|-------------|---|------|-----|-------------|---|-----|-------------|-----|------|-------------|---|------|-----|-------------|---|-----|-------------|-----|------|-------------|---|------|-----|-------------|---|-----|-------------|-----|------|-------------|---|------|-----|-------------|---|-----|-------------|-----|------|-------------|---|------|-----|-------------|---|-----|-------------|-----|------|-------------|---|------|-----|-------------|---|-----|-------------|-----|------|-------------|---|------|-----|-------------|---|-----|-------------|-----|------|-------------|---|------|-----|-------------|---|-----|-------------|-----|------|-------------|---|------|-----|-------------|---|-----|-------------|---|------|-------------|---|-----|-----|-------------|---|-----|-------------|---|------|-------------|---|-----|-----|-------------|---|-----|-------------|-----|------|-------------|---|-----|-----|-------------|---|-----|-------------|---|------|-------------|---|-----|-----|-----|-----|-----|-----|-----|------|-------------|---|-----|-----|-------------|---|-----|-------------|---|-----|-----|-----|-----|-----|-------------|---|-----|-----|-----|-----|-----|-----|-----|-----|-------------|---|-----|-----|-----|-----|-----|-----|-----|-----|-------------|---|-----|-----|-----|-----|-----|-----|-----|-----|-------------|---|-----|-----|-----|-----|-----|-----|------|-----|-------------|---|-----|-----|-----|-----|-----|-----|------|-----|-------------|---|-----|-----|-----|-----|-----|-----|
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|  |          |                             |            | SYM D DESCRIPTION REVISED PER TDRR 00872 DATE 17 Jun 63 APPROVAL CR |                             |            |          |                             |            |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| TABLE II   |          |                             |            |   |                             |            |          |                             |            |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| <table><tr><th rowspan="2">CAPACITANCE MICROFARADS<br/>TOL = ±5%</th><th colspan="3">200 VDC</th><th colspan="3">400 VDC</th><th colspan="3">600 VDC</th></tr><tr><th>DASH NO.</th><th>MANUFACTURER'S PART NO. ***</th><th>CASE SIZE*</th><th>DASH NO.</th><th>MANUFACTURER'S PART NO. ***</th><th>CASE SIZE*</th><th>DASH NO.</th><th>MANUFACTURER'S PART NO. ***</th><th>CASE SIZE*</th></tr><tr><td>.0010</td><td>-1</td><td>118P10252S2</td><td>A</td><td>---</td><td>---</td><td>---</td><td>-75</td><td>118P10256S2</td><td>C</td></tr><tr><td>.0012</td><td>-2</td><td>118P12252S2</td><td>A</td><td>---</td><td>---</td><td>---</td><td>-76</td><td>118P12256S2</td><td>C</td></tr><tr><td>.0015</td><td>-3</td><td>118P15252S2</td><td>A</td><td>---</td><td>---</td><td>---</td><td>-77</td><td>118P15256S2</td><td>C</td></tr><tr><td>.0018</td><td>-4</td><td>118P18252S2</td><td>A</td><td>---</td><td>---</td><td>---</td><td>-78</td><td>118P18256S2</td><td>C</td></tr><tr><td>.0022</td><td>-5</td><td>118P22252S2</td><td>A</td><td>---</td><td>---</td><td>---</td><td>-79</td><td>118P22256S2</td><td>C</td></tr><tr><td>.0027</td><td>-6</td><td>118P27252S2</td><td>A</td><td>---</td><td>---</td><td>---</td><td>-80</td><td>118P27256S2</td><td>C</td></tr><tr><td>.0033</td><td>-7</td><td>118P33252S2</td><td>A</td><td>---</td><td>---</td><td>---</td><td>-81</td><td>118P33256S2</td><td>C</td></tr><tr><td>.0039</td><td>-8</td><td>118P39252S2</td><td>A</td><td>---</td><td>---</td><td>---</td><td>-82</td><td>118P39256S2</td><td>D</td></tr><tr><td>.0047</td><td>-9</td><td>118P47252S2</td><td>A</td><td>---</td><td>---</td><td>---</td><td>-83</td><td>118P47256S2</td><td>D</td></tr><tr><td>.0056</td><td>-10</td><td>118P56252S2</td><td>A</td><td>---</td><td>---</td><td>---</td><td>-84</td><td>118P56256S2</td><td>D</td></tr><tr><td>.0068</td><td>-11</td><td>118P68252S2</td><td>A</td><td>---</td><td>---</td><td>---</td><td>-85</td><td>118P68256S2</td><td>D</td></tr><tr><td>.0082</td><td>-12</td><td>118P82252S2</td><td>A</td><td>---</td><td>---</td><td>---</td><td>-86</td><td>118P82256S2</td><td>D</td></tr><tr><td>.010</td><td>-13</td><td>118P10352S2</td><td>A</td><td>-47</td><td>118P10354S2</td><td>D**</td><td>-87</td><td>118P10356S2</td><td>D</td></tr><tr><td>.012</td><td>-14</td><td>118P12352S2</td><td>B</td><td>-48</td><td>118P12354S2</td><td>D**</td><td>-88</td><td>118P12356S2</td><td>D</td></tr><tr><td>.015</td><td>-15</td><td>118P15352S2</td><td>B</td><td>-49</td><td>118P15354S2</td><td>D**</td><td>-89</td><td>118P15356S2</td><td>D</td></tr><tr><td>.018</td><td>-16</td><td>118P18352S2</td><td>C</td><td>-50</td><td>118P18354S2</td><td>D</td><td>-90</td><td>118P18356S2</td><td>E</td></tr><tr><td>.022</td><td>-17</td><td>118P22352S2</td><td>C</td><td>-51</td><td>118P22354S2</td><td>D</td><td>-91</td><td>118P22356S2</td><td>E</td></tr><tr><td>.027</td><td>-18</td><td>118P27352S2</td><td>C</td><td>-52</td><td>118P27354S2</td><td>E**</td><td>-92</td><td>118P27356S2</td><td>E</td></tr><tr><td>.033</td><td>-19</td><td>118P33352S2</td><td>C</td><td>-53</td><td>118P33354S2</td><td>E**</td><td>-93</td><td>118P33356S2</td><td>E</td></tr><tr><td>.039</td><td>-20</td><td>118P39352S2</td><td>D</td><td>-54</td><td>118P39354S2</td><td>G**</td><td>-94</td><td>118P39356S2</td><td>G</td></tr><tr><td>.047</td><td>-21</td><td>118P47352S2</td><td>D</td><td>-55</td><td>118P47354S2</td><td>G**</td><td>-95</td><td>118P47356S2</td><td>G</td></tr><tr><td>.056</td><td>-22</td><td>118P56352S2</td><td>D</td><td>-56</td><td>118P56354S2</td><td>G**</td><td>-96</td><td>118P56356S2</td><td>G</td></tr><tr><td>.068</td><td>-23</td><td>118P68352S2</td><td>D</td><td>-57</td><td>118P68354S2</td><td>G**</td><td>-97</td><td>118P68356S2</td><td>G</td></tr><tr><td>.082</td><td>-24</td><td>118P82352S2</td><td>D</td><td>-58</td><td>118P82354S2</td><td>H**</td><td>-98</td><td>118P82356S2</td><td>H</td></tr><tr><td>.100</td><td>-25</td><td>118P10452S2</td><td>D</td><td>-59</td><td>118P10454S2</td><td>H**</td><td>-99</td><td>118P10456S2</td><td>H</td></tr><tr><td>.120</td><td>-26</td><td>118P12452S2</td><td>E</td><td>-60</td><td>118P12454S2</td><td>H</td><td>-100</td><td>118P12456S2</td><td>J</td></tr><tr><td>.150</td><td>-27</td><td>118P15452S2</td><td>E</td><td>-61</td><td>118P15454S2</td><td>H</td><td>-101</td><td>118P15456S2</td><td>J</td></tr><tr><td>.180</td><td>-28</td><td>118P18452S2</td><td>F</td><td>-62</td><td>118P18454S2</td><td>K**</td><td>-102</td><td>118P18456S2</td><td>K</td></tr><tr><td>.220</td><td>-29</td><td>118P22452S2</td><td>F</td><td>-63</td><td>118P22454S2</td><td>K**</td><td>-103</td><td>118P22456S2</td><td>K</td></tr><tr><td>.270</td><td>-30</td><td>118P27452S2</td><td>G</td><td>-64</td><td>118P27454S2</td><td>L**</td><td>-104</td><td>118P27456S2</td><td>L</td></tr><tr><td>.330</td><td>-31</td><td>118P33452S2</td><td>G</td><td>-65</td><td>118P33454S2</td><td>L**</td><td>-105</td><td>118P33456S2</td><td>L</td></tr><tr><td>.390</td><td>-32</td><td>118P39452S2</td><td>H</td><td>-66</td><td>118P39454S2</td><td>M**</td><td>-106</td><td>118P39456S2</td><td>M</td></tr><tr><td>.470</td><td>-33</td><td>118P47452S2</td><td>H</td><td>-67</td><td>118P47454S2</td><td>M**</td><td>-107</td><td>118P47456S2</td><td>M</td></tr><tr><td>.560</td><td>-34</td><td>118P56452S2</td><td>H</td><td>-68</td><td>118P56454S2</td><td>N**</td><td>-108</td><td>118P5645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|          |                             |            |   |                             |            |          |                             |            |  |  | CAPACITANCE MICROFARADS<br>TOL = ±5% | 200 VDC |  |  | 400 VDC |  |  | 600 VDC |  |  | DASH NO. | MANUFACTURER'S PART NO. *** | CASE SIZE* | DASH NO. | MANUFACTURER'S PART NO. *** | CASE SIZE* | DASH NO. | MANUFACTURER'S PART NO. *** | CASE SIZE* | .0010 | -1 | 118P10252S2 | A | --- | --- | --- | -75 | 118P10256S2 | C | .0012 | -2 | 118P12252S2 | A | --- | --- | --- | -76 | 118P12256S2 | C | .0015 | -3 | 118P15252S2 | A | --- | --- | --- | -77 | 118P15256S2 | C | .0018 | -4 | 118P18252S2 | A | --- | --- | --- | -78 | 118P18256S2 | C | .0022 | -5 | 118P22252S2 | A | --- | --- | --- | -79 | 118P22256S2 | C | .0027 | -6 | 118P27252S2 | A | --- | --- | --- | -80 | 118P27256S2 | C | .0033 | -7 | 118P33252S2 | A | --- | --- | --- | -81 | 118P33256S2 | C | .0039 | -8 | 118P39252S2 | A | --- | --- | --- | -82 | 118P39256S2 | D | .0047 | -9 | 118P47252S2 | A | --- | --- | --- | -83 | 118P47256S2 | D | .0056 | -10 | 118P56252S2 | A | --- | --- | --- | -84 | 118P56256S2 | D | .0068 | -11 | 118P68252S2 | A | --- | --- | --- | -85 | 118P68256S2 | D | .0082 | -12 | 118P82252S2 | A | --- | --- | --- | -86 | 118P82256S2 | D | .010 | -13 | 118P10352S2 | A | -47 | 118P10354S2 | D** | -87 | 118P10356S2 | D | .012 | -14 | 118P12352S2 | B | -48 | 118P12354S2 | D** | -88 | 118P12356S2 | D | .015 | -15 | 118P15352S2 | B | -49 | 118P15354S2 | D** | -89 | 118P15356S2 | D | .018 | -16 | 118P18352S2 | C | -50 | 118P18354S2 | D | -90 | 118P18356S2 | E | .022 | -17 | 118P22352S2 | C | -51 | 118P22354S2 | D | -91 | 118P22356S2 | E | .027 | -18 | 118P27352S2 | C | -52 | 118P27354S2 | E** | -92 | 118P27356S2 | E | .033 | -19 | 118P33352S2 | C | -53 | 118P33354S2 | E** | -93 | 118P33356S2 | E | .039 | -20 | 118P39352S2 | D | -54 | 118P39354S2 | G** | -94 | 118P39356S2 | G | .047 | -21 | 118P47352S2 | D | -55 | 118P47354S2 | G** | -95 | 118P47356S2 | G | .056 | -22 | 118P56352S2 | D | -56 | 118P56354S2 | G** | -96 | 118P56356S2 | G | .068 | -23 | 118P68352S2 | D | -57 | 118P68354S2 | G** | -97 | 118P68356S2 | G | .082 | -24 | 118P82352S2 | D | -58 | 118P82354S2 | H** | -98 | 118P82356S2 | H | .100 | -25 | 118P10452S2 | D | -59 | 118P10454S2 | H** | -99 | 118P10456S2 | H | .120 | -26 | 118P12452S2 | E | -60 | 118P12454S2 | H | -100 | 118P12456S2 | J | .150 | -27 | 118P15452S2 | E | -61 | 118P15454S2 | H | -101 | 118P15456S2 | J | .180 | -28 | 118P18452S2 | F | -62 | 118P18454S2 | K** | -102 | 118P18456S2 | K | .220 | -29 | 118P22452S2 | F | -63 | 118P22454S2 | K** | -103 | 118P22456S2 | K | .270 | -30 | 118P27452S2 | G | -64 | 118P27454S2 | L** | -104 | 118P27456S2 | L | .330 | -31 | 118P33452S2 | G | -65 | 118P33454S2 | L** | -105 | 118P33456S2 | L | .390 | -32 | 118P39452S2 | H | -66 | 118P39454S2 | M** | -106 | 118P39456S2 | M | .470 | -33 | 118P47452S2 | H | -67 | 118P47454S2 | M** | -107 | 118P47456S2 | M | .560 | -34 | 118P56452S2 | H | -68 | 118P56454S2 | N** | -108 | 118P56456S2 | N | .680 | -35 | 118P68452S2 | H | -69 | 118P68454S2 | N** | -109 | 118P68456S2 | N | .820 | -36 | 118P82452S2 | J | -70 | 118P82454S2 | P | -110 | 118P82456S2 | R | 1.0 | -37 | 118P10552S2 | J | -71 | 118P10554S2 | P | -111 | 118P10556S2 | R | 1.5 | -38 | 118P15552S2 | L | -72 | 118P15554S2 | R** | -112 | 118P15556S2 | R | 2.0 | -39 | 118P20552S2 | M | -73 | 118P20554S2 | R | -113 | 118P20556S2 | S | 2.5 | --- | --- | --- | --- | --- | --- | -114 | 118P25556S2 | U | 3.0 | -40 | 118P30552S2 | N | -74 | 118P30554S2 | U | --- | --- | --- | 4.0 | -41 | 118P40552S2 | P | --- | --- | --- | --- | --- | --- | 5.0 | -42 | 118P50552S2 | R | --- | --- | --- | --- | --- | --- | 6.0 | -43 | 118P60552S2 | R | --- | --- | --- | --- | --- | --- | 8.0 | -44 | 118P80552S2 | R | --- | --- | --- | --- | --- | --- | 10.0 | -45 | 118P10652S2 | T | --- | --- | --- | --- | --- | --- | 12.0 | -46 | 118P12652S2 | U | --- | --- | --- | --- | --- | --- |
| CAPACITANCE MICROFARADS<br>TOL = ±5%   | 200 VDC  |                             |            | 400 VDC   |                             |            | 600 VDC  |                             |            |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
|  | DASH NO. | MANUFACTURER'S PART NO. *** | CASE SIZE* | DASH NO.  | MANUFACTURER'S PART NO. *** | CASE SIZE* | DASH NO. | MANUFACTURER'S PART NO. *** | CASE SIZE* |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .0010  | -1       | 118P10252S2                 | A          | ---   | ---                         | ---        | -75      | 118P10256S2                 | C          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .0012  | -2       | 118P12252S2                 | A          | ---   | ---                         | ---        | -76      | 118P12256S2                 | C          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .0015  | -3       | 118P15252S2                 | A          | ---   | ---                         | ---        | -77      | 118P15256S2                 | C          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .0018  | -4       | 118P18252S2                 | A          | ---   | ---                         | ---        | -78      | 118P18256S2                 | C          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .0022  | -5       | 118P22252S2                 | A          | ---   | ---                         | ---        | -79      | 118P22256S2                 | C          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .0027  | -6       | 118P27252S2                 | A          | ---   | ---                         | ---        | -80      | 118P27256S2                 | C          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .0033  | -7       | 118P33252S2                 | A          | ---   | ---                         | ---        | -81      | 118P33256S2                 | C          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .0039  | -8       | 118P39252S2                 | A          | ---   | ---                         | ---        | -82      | 118P39256S2                 | D          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .0047  | -9       | 118P47252S2                 | A          | ---   | ---                         | ---        | -83      | 118P47256S2                 | D          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .0056  | -10      | 118P56252S2                 | A          | ---   | ---                         | ---        | -84      | 118P56256S2                 | D          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .0068  | -11      | 118P68252S2                 | A          | ---   | ---                         | ---        | -85      | 118P68256S2                 | D          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .0082  | -12      | 118P82252S2                 | A          | ---   | ---                         | ---        | -86      | 118P82256S2                 | D          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .010   | -13      | 118P10352S2                 | A          | -47   | 118P10354S2                 | D**        | -87      | 118P10356S2                 | D          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .012   | -14      | 118P12352S2                 | B          | -48   | 118P12354S2                 | D**        | -88      | 118P12356S2                 | D          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .015   | -15      | 118P15352S2                 | B          | -49   | 118P15354S2                 | D**        | -89      | 118P15356S2                 | D          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .018   | -16      | 118P18352S2                 | C          | -50   | 118P18354S2                 | D          | -90      | 118P18356S2                 | E          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .022   | -17      | 118P22352S2                 | C          | -51   | 118P22354S2                 | D          | -91      | 118P22356S2                 | E          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .027   | -18      | 118P27352S2                 | C          | -52   | 118P27354S2                 | E**        | -92      | 118P27356S2                 | E          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .033   | -19      | 118P33352S2                 | C          | -53   | 118P33354S2                 | E**        | -93      | 118P33356S2                 | E          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .039   | -20      | 118P39352S2                 | D          | -54   | 118P39354S2                 | G**        | -94      | 118P39356S2                 | G          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .047   | -21      | 118P47352S2                 | D          | -55   | 118P47354S2                 | G**        | -95      | 118P47356S2                 | G          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .056   | -22      | 118P56352S2                 | D          | -56   | 118P56354S2                 | G**        | -96      | 118P56356S2                 | G          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .068   | -23      | 118P68352S2                 | D          | -57   | 118P68354S2                 | G**        | -97      | 118P68356S2                 | G          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .082   | -24      | 118P82352S2                 | D          | -58   | 118P82354S2                 | H**        | -98      | 118P82356S2                 | H          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .100   | -25      | 118P10452S2                 | D          | -59   | 118P10454S2                 | H**        | -99      | 118P10456S2                 | H          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .120   | -26      | 118P12452S2                 | E          | -60   | 118P12454S2                 | H          | -100     | 118P12456S2                 | J          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .150   | -27      | 118P15452S2                 | E          | -61   | 118P15454S2                 | H          | -101     | 118P15456S2                 | J          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .180   | -28      | 118P18452S2                 | F          | -62   | 118P18454S2                 | K**        | -102     | 118P18456S2                 | K          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .220   | -29      | 118P22452S2                 | F          | -63   | 118P22454S2                 | K**        | -103     | 118P22456S2                 | K          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .270   | -30      | 118P27452S2                 | G          | -64   | 118P27454S2                 | L**        | -104     | 118P27456S2                 | L          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .330   | -31      | 118P33452S2                 | G          | -65   | 118P33454S2                 | L**        | -105     | 118P33456S2                 | L          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .390   | -32      | 118P39452S2                 | H          | -66   | 118P39454S2                 | M**        | -106     | 118P39456S2                 | M          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .470   | -33      | 118P47452S2                 | H          | -67   | 118P47454S2                 | M**        | -107     | 118P47456S2                 | M          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .560   | -34      | 118P56452S2                 | H          | -68   | 118P56454S2                 | N**        | -108     | 118P56456S2                 | N          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .680   | -35      | 118P68452S2                 | H          | -69   | 118P68454S2                 | N**        | -109     | 118P68456S2                 | N          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| .820   | -36      | 118P82452S2                 | J          | -70   | 118P82454S2                 | P          | -110     | 118P82456S2                 | R          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| 1.0  | -37      | 118P10552S2                 | J          | -71   | 118P10554S2                 | P          | -111     | 118P10556S2                 | R          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| 1.5  | -38      | 118P15552S2                 | L          | -72   | 118P15554S2                 | R**        | -112     | 118P15556S2                 | R          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| 2.0  | -39      | 118P20552S2                 | M          | -73   | 118P20554S2                 | R          | -113     | 118P20556S2                 | S          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| 2.5  | ---      | ---                         | ---        | ---   | ---                         | ---        | -114     | 118P25556S2                 | U          |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| 3.0  | -40      | 118P30552S2                 | N          | -74   | 118P30554S2                 | U          | ---      | ---                         | ---        |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| 4.0  | -41      | 118P40552S2                 | P          | ---   | ---                         | ---        | ---      | ---                         | ---        |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| 5.0  | -42      | 118P50552S2                 | R          | ---   | ---                         | ---        | ---      | ---                         | ---        |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| 6.0  | -43      | 118P60552S2                 | R          | ---   | ---                         | ---        | ---      | ---                         | ---        |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| 8.0  | -44      | 118P80552S2                 | R          | ---   | ---                         | ---        | ---      | ---                         | ---        |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| 10.0   | -45      | 118P10652S2                 | T          | ---   | ---                         | ---        | ---      | ---                         | ---        |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| 12.0   | -46      | 118P12652S2                 | U          | ---   | ---                         | ---        | ---      | ---                         | ---        |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |
| * SEE TABLE II FOR CASE DIAMETER AND LENGTH.<br>** THESE VALUES ARE AVAILABLE IN SAME CASE SIZE IN 600 VDC RATING.<br>*** SEE NOTE 3 FOR COMPLETE ORDERING INFORMATION.  |          |                             |            |   |                             |            |          |                             |            |  |  |                                      |         |  |  |         |  |  |         |  |  |          |                             |            |          |                             |            |          |                             |            |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |    |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |       |     |             |   |     |     |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |   |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |     |     |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |   |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |     |      |             |   |      |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |             |   |     |             |     |      |             |   |     |     |             |   |     |             |   |      |             |   |     |     |     |     |     |     |     |      |             |   |     |     |             |   |     |             |   |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |     |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |      |     |             |   |     |     |     |     |     |     |

|  |                         |   |                  |
|--|-------------------------|---|------------------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION                           | FIND NO.         |
| LIST OF MATERIALS                                  |                         |   |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS         |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS            |                  |
| DRAWN BY <i>[Signature]</i> DATE <i>28 Jan 63</i>  |                         | CAPACITOR, FIXED,<br>METALIZED PAPER PLUS FILM        |                  |
| CHECKED BY <i>[Signature]</i> DATE <i>9 Jan 63</i> |                         | SPECIFICATION CONTROL DRAWING                         |                  |
| DO NOT SCALE THIS DRAWING                          |                         | APPROVAL <i>[Signature]</i> DATE <i>23 Jan 63</i>     |                  |
| MATERIAL   |                         | APPROVAL  |                  |
| HEAT TREATMENT                                     |                         | NASA APPROVAL <i>[Signature]</i> DATE <i>1-23-63</i>  |                  |
| FINAL FINISH                                       |                         | MIT APPROVAL <i>[Signature]</i> DATE <i>23 Jan 63</i> |                  |
| CODE IDENT NO.                                     |                         | SIZE  | NASA DRAWING NO. |
| SCALE NONE   |                         | C   | 1010264          |
| WT   |                         | SHEET 2 OF 2  |                  |





NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY FOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

NOTES:

1. REQUIREMENTS:

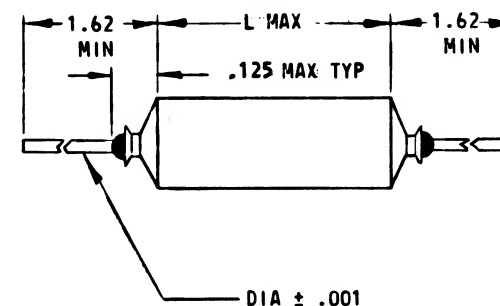
- A. RATINGS: CONTINUOUS WORKING VOLTAGE AT 125°C; SEE TABLE I  
MAXIMUM CURRENT; 1 AMPERE  
OPERATING TEMPERATURE RANGE; -55 TO +125°C
- B. INSULATION RESISTANCE:  
AT 25°C; INSULATION RESISTANCE X CAPACITANCE = 2000 MEGOHM - MICROFARADS MINIMUM UP TO A PERMISSIBLE MAXIMUM OF 12,000 MEGOHMS INSULATION RESISTANCE. 3000 MEGOHMS MINIMUM BETWEEN CASE AND EITHER TERMINAL.  
AT 125°C; INSULATION RESISTANCE X CAPACITANCE = 10 MEGOHM-MICROFARADS (200 VDC) OR 40 MEGOHM - MICROFARADS (400 OR 600 VDC) MINIMUM UP TO A PERMISSIBLE MAXIMUM OF 150 MEGOHMS (200 VDC) OR 600 MEGOHMS (400 OR 600 VDC) INSULATION RESISTANCE.
- C. POWER FACTOR: 1% MAXIMUM FOR CASE SIZES D THRU U (SEE TABLE II) AND 1.5% MAXIMUM FOR SIZES A, B, AND C.
- D. CONSTRUCTION: PARTS SHALL BE CONSTRUCTED FROM METALIZED PAPER AND A MINERAL WAX IMPREGNATED POLYESTER FILM. THE CASE SHALL BE OF METAL AND SEALED. CONNECTIONS SHALL BE SUCH THAT THE PARTS SHALL BE ESSENTIALLY NON-INDUCTIVE.
- E. LEAD MATERIAL: LEADS SHALL BE PURE NICKEL IN ACCORDANCE WITH ND 1015400.
- F. LEAD STRENGTH: LEADS SHALL WITHSTAND A 5 POUND AXIAL PULL FOR 1 MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.
- G. ENVIRONMENTAL TESTS: CAPACITORS SHALL BE CAPABLE OF MEETING ALL ENVIRONMENTAL REQUIREMENTS OF MIL-C-25.
- H. MARKING: EACH CAPACITOR SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL AND PART NUMBER, CAPACITANCE VALUE, TOLERANCE, AND VOLTAGE RATING. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING AND DASH NUMBER TOGETHER WITH THE REVISION.
- J. QUALITY ASSURANCE: SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS II IN ADDITION TO THIS DRAWING AND MIL-C-25.
2. INTERPRET THIS DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.
3. NOTE - WHEN ORDERING PARTS, SPECIFY MANUFACTURER PART NUMBER PLUS NICKEL LEADS IN ACCORDANCE WITH ND 1015400.

ORIGINAL SOURCE OF SUPPLY:

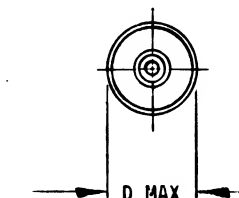
SPRAGUE ELECTRIC CO.  
NO. ADAMS, MASS.  
CODE IDENT NO. 56289

|                           |         |
|---------------------------|---------|
| E                         | E       |
| D                         | D       |
| SHEET 1                   | SHEET 2 |
| REVISION STATUS OF SHEETS |         |

|  |  |   |
|--|--|---|
|  |  | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>FRACTIONS DECIMALS ANGLES<br>± ± ±<br>DO NOT SCALE THIS DRAWING<br>MATERIAL<br>SEE NOTES<br>HEAT TREATMENT<br>NONE<br>FINAL FINISH<br>NONE<br>NEXT ASSY USED ON<br>APPLICATION |
|--|--|---|

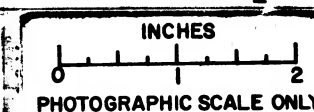


SEE TABLE II



- Ⓔ REPLACED BY REV F WITH CHANGES  
Ⓒ REPLACES REV B WITH CHANGE

|   |                         |   |                             |
|---|-------------------------|---|-----------------------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION   | FIND NO.                    |
| LIST OF MATERIALS   |                         |   |                             |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.   |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                                      |                             |
| DRAWN <i>[Signature]</i> DATE <i>23 Jan 63</i><br>CHECKED <i>[Signature]</i> DATE <i>23 Jan 63</i><br>APPROVAL <i>[Signature]</i><br>APPROVAL |                         | CAPACITOR, FIXED,<br>METALIZED PAPER PLUS FILM<br>SPECIFICATION CONTROL DRAWING |                             |
| NASA APPROVAL <i>[Signature]</i> 1-23-63<br>MIT APPROVAL <i>[Signature]</i> 23 Jan 63   |                         | CODE IDENT NO. C<br>SIZE C  | NASA DRAWING NO.<br>1010264 |
| SCALE NONE  |                         | WT  | SHEET 1 OF 2                |



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CLASS B RELEASE TDR No. 00295 DATE

23 Jan 1963

4

3

2

1

1010264

REVISIONS

| SYM | DESCRIPTION                             | DATE  | APPROVAL   |
|-----|---|-------|------------|
| D   | REVISED PER TDRR                        | 00872 | 1/24/63 CR |
| E   | REPLACED BY REV F WITH CHANGES PER TDRR | 02210 | 2/4/63 WL  |

TABLE II

| CASE SIZE | D X L         | LEAD DIAMETER |
|-----------|---------------|---------------|
| A         | .191 X .781   | .020          |
| B         | .211 X .781   | .020          |
| C         | .251 X .781   | .025          |
| D         | .328 X .875   | .025          |
| E         | .328 X 1.093  | .025          |
| F         | .416 X .875   | .032          |
| G         | .416 X 1.093  |               |
| H         | .516 X 1.093  |               |
| J         | .578 X 1.093  |               |
| K         | .578 X 1.406  |               |
| L         | .578 X 1.656  |               |
| M         | .686 X 1.656  |               |
| N         | .686 X 1.906  |               |
| P         | .766 X 1.906  |               |
| R         | 1.016 X 1.906 |               |
| S         | 1.016 X 2.156 |               |
| T         | 1.016 X 2.406 |               |
| U         | 1.016 X 2.656 | .032          |

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DATE 23 Jan 1963

1010264

REPLACED BY REV F WITH CHANGES

MIT INSTRUMENTATION LAB

CONTRACT

DATE 23 Jan 63

CHECKED J. M. Miller 23 Jan 63

APPROVAL J. M. Miller 23 Jan 63

APPROVAL

NASA APPROVAL 1/23/63

MIT APPROVAL 1/23/63

LIST OF MATERIALS

MANNED SPACECRAFT CENTER

HOUSTON, TEXAS

CAPACITOR, FIXED, METALIZED PAPER PLUS FILM

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. C

SIZE C

NASA DRAWING NO. 1010264

SCALE NONE

WT

SHEET 2 OF 2

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES

TOLERANCES ON

FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

1010264

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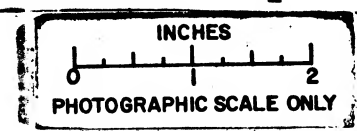
1010264

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| CAPACITANCE<br>MICROFARADS<br>TOL = ±5% | 200 VDC  |                             |            | 400 VDC  |                             |            | 600 VDC  |                             |            |
|---|----------|-----------------------------|------------|----------|-----------------------------|------------|----------|-----------------------------|------------|
|   | DASH NO. | MANUFACTURER'S PART NO. *** | CASE SIZE* | DASH NO. | MANUFACTURER'S PART NO. *** | CASE SIZE* | DASH NO. | MANUFACTURER'S PART NO. *** | CASE SIZE* |
| .0010                                   | -1       | 118P10252S2                 | A          |          |                             |            | -75      | 118P10256S2                 | C          |
| .0012                                   | -2       | 118P12252S2                 | A          |          |                             |            | -76      | 118P12256S2                 | C          |
| .0015                                   | -3       | 118P15252S2                 | A          |          |                             |            | -77      | 118P15256S2                 | C          |
| .0018                                   | -4       | 118P18252S2                 | A          |          |                             |            | -78      | 118P18256S2                 | C          |
| .0022                                   | -5       | 118P22252S2                 | A          |          |                             |            | -79      | 118P22256S2                 | C          |
| .0027                                   | -6       | 118P27252S2                 | A          |          |                             |            | -80      | 118P27256S2                 | C          |
| .0033                                   | -7       | 118P33252S2                 | A          |          |                             |            | -81      | 118P33256S2                 | C          |
| .0039                                   | -8       | 118P39252S2                 | A          |          |                             |            | -82      | 118P39256S2                 | D          |
| .0047                                   | -9       | 118P47252S2                 | A          |          |                             |            | -83      | 118P47256S2                 | D          |
| .0056                                   | -10      | 118P56252S2                 | A          |          |                             |            | -84      | 118P56256S2                 | D          |
| .0068                                   | -11      | 118P68252S2                 | A          |          |                             |            | -85      | 118P68256S2                 | D          |
| .0082                                   | -12      | 118P82252S2                 | A          |          |                             |            | -86      | 118P82256S2                 | D          |
| .010                                    | -13      | 118P10352S2                 | A          | -47      | 118P10354S2                 | D**        | -87      | 118P10356S2                 | D          |
| .012                                    | -14      | 118P12352S2                 | B          | -48      | 118P12354S2                 | D**        | -88      | 118P12356S2                 | D          |
| .015                                    | -15      | 118P15352S2                 | B          | -49      | 118P15354S2                 | D**        | -89      | 118P15356S2                 | D          |
| .018                                    | -16      | 118P18352S2                 | C          | -50      | 118P18354S2                 | D          | -90      | 118P18356S2                 | E          |
| .022                                    | -17      | 118P22352S2                 | C          | -51      | 118P22354S2                 | D          | -91      | 118P22356S2                 | E          |
| .027                                    | -18      | 118P27352S2                 | C          | -52      | 118P27354S2                 | E**        | -92      | 118P27356S2                 | E          |
| .033                                    | -19      | 118P33352S2                 | C          | -53      | 118P33354S2                 | E**        | -93      | 118P33356S2                 | E          |
| .039                                    | -20      | 118P39352S2                 | D          | -54      | 118P39354S2                 | G**        | -94      | 118P39356S2                 | G          |
| .047                                    | -21      | 118P47352S2                 | D          | -55      | 118P47354S2                 | G**        | -95      | 118P47356S2                 | G          |
| .056                                    | -22      | 118P56352S2                 | D          | -56      | 118P56354S2                 | G**        | -96      | 118P56356S2                 | G          |
| .068                                    | -23      | 118P68352S2                 | D          | -57      | 118P68354S2                 | G**        | -97      | 118P68356S2                 | G          |
| .082                                    | -24      | 118P82352S2                 | D          | -58      | 118P82354S2                 | H**        | -98      | 118P82356S2                 | H          |
| .100                                    | -25      | 118P10452S2                 | D          | -59      | 118P10454S2                 | H**        | -99      | 118P10456S2                 | H          |
| .120                                    | -26      | 118P12452S2                 | E          | -60      | 118P12454S2                 | H          | -100     | 118P12456S2                 | J          |
| .150                                    | -27      | 118P15452S2                 | E          | -61      | 118P15454S2                 | H          | -101     | 118P15456S2                 | J          |
| .180                                    | -28      | 118P18452S2                 | F          | -62      | 118P18454S2                 | K**        | -102     | 118P18456S2                 | K          |
| .220                                    | -29      | 118P22452S2                 | F          | -63      | 118P22454S2                 | K**        | -103     | 118P22456S2                 | K          |
| .270                                    | -30      | 118P27452S2                 | G          | -64      | 118P27454S2                 | L**        | -104     | 118P27456S2                 | L          |
| .330                                    | -31      | 118P33452S2                 | G          | -65      | 118P33454S2                 | L**        | -105     | 118P33456S2                 | L          |
| .390                                    | -32      | 118P39452S2                 | H          | -66      | 118P39454S2                 | M**        | -106     | 118P39456S2                 | M          |
| .470                                    | -33      | 118P47452S2                 | H          | -67      | 118P47454S2                 | M**        | -107     | 118P47456S2                 | M          |
| .560                                    | -34      | 118P56452S2                 | H          | -68      | 118P56454S2                 | N**        | -108     | 118P56456S2                 | N          |
| .680                                    | -35      | 118P68452S2                 | H          | -69      | 118P68454S2                 | N**        | -109     | 118P68456S2                 | N          |
| .820                                    | -36      | 118P82452S2                 | J          | -70      | 118P82454S2                 | P          | -110     | 118P82456S2                 | R          |
| 1.0                                     | -37      | 118P10552S2                 | J          | -71      | 118P10554S2                 | P          | -111     | 118P10556S2                 | R          |
| 1.5                                     | -38      | 118P15552S2                 | L          | -72      | 118P15554S2                 | R**        | -112     | 118P15556S2                 | R          |
| 2.0                                     | -39      | 118P20552S2                 | M          | -73      | 118P20554S2                 | R          | -113     | 118P20556S2                 | S          |
| 2.5                                     |          |                             |            |          |                             |            | -114     | 118P25556S2                 | U          |
| 3.0                                     | -40      | 118P30552S2                 | N          | -74      | 118P30554S2                 | U          |          |                             |            |
| 4.0                                     | -41      | 118P40552S2                 | P          |          |                             |            |          |                             |            |
| 5.0                                     | -42      | 118P50552S2                 | R          |          |                             |            |          |                             |            |
| 6.0                                     | -43      | 118P60552S2                 | R          |          |                             |            |          |                             |            |
| 8.0                                     | -44      | 118P80552S2                 | R          |          |                             |            |          |                             |            |
| 10.0                                    | -45      | 118P10652S2                 | T          |          |                             |            |          |                             |            |
| 12.0                                    | -46      | 118P12652S2                 | U          |          |                             |            |          |                             |            |

- SEE TABLE II FOR CASE DIAMETER AND LENGTH.
- \*\* THESE VALUES ARE AVAILABLE IN SAME CASE SIZE IN 600 VDC RATING.
- \*\*\* SEE NOTE 3 FOR COMPLETE ORDERING INFORMATION.



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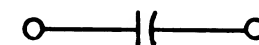
F 1010264

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| F         | REPLACES REV E WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02210 | 7/24/43 | WLL      |

#### REQUIREMENTS:

##### GENERAL:

- D INTERPRET DRAWING SYMBOLS, ABBREVIATIONS, AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
- SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
- UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
- PACKAGING AND PACKING: UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING:
- EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT. LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT. BODY MOUNTING SHALL BE SUCH THAT CAPACITORS CAN BE EASILY GRIPPED BY THE BODY AND REMOVED FROM THE PACKAGE. HANDLING OF LEADS IS TO BE HELD TO A MINIMUM.
- C UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-18312 EXCEPT AS SPECIFIED HEREIN.



GRAPHICAL SYMBOL

##### INSPECTION AND ACCEPTANCE:

##### MECHANICAL REQUIREMENTS:

DIMENSIONS PER OUTLINE AND TABLE II

LEAD DATA: NICKEL PER ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

MARKING: PER MIL-STD-130, EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER, AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. THE MANUFACTURER'S PART OR TYPE NUMBER, CAPACITANCE VALUE, TOLERANCE, AND VOLTAGE RATING MAY APPEAR ON THE PART AND PACKAGE. EACH CONTAINER SHALL ALSO INCLUDE THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER.

##### ELECTRICAL REQUIREMENTS:

CAPACITANCE: PER TABLE I AT +25°C. AND 1000 ± 100 CPS FOR VALUES UP TO 1.0 MFD AND 60 ± 6 CPS FOR VALUES GREATER THAN 1.0 MFD.

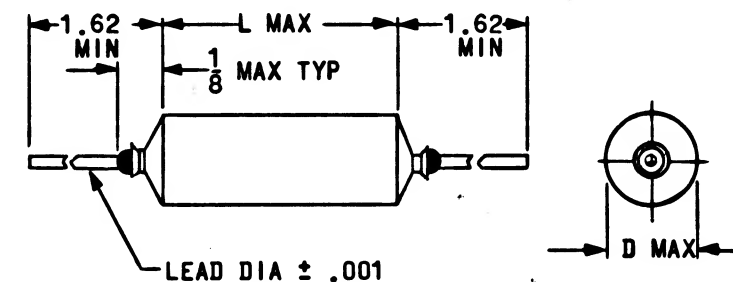
CAPACITANCE TOLERANCE: ±5% AT +25°C AND 1000 ± 100 CPS FOR VALUES UP TO 1.0 MFD AND 60 ± 6 CPS FOR VALUES GREATER THAN 1.0 MFD.

##### DESIGN REQUIREMENTS:

DC WORKING VOLTAGE: PER TABLE AT +125°C.

OPERATING TEMPERATURE RANGE: -55°C TO +125°C.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



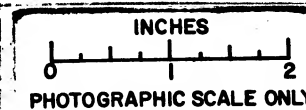
SEE TABLE II

| F                         | F       | F       |
|---------------------------|---------|---------|
| SHEET 1                   | SHEET 2 | SHEET 3 |
| REVISION STATUS OF SHEETS |         |         |

Ⓡ REPLACES REV(E) WITH CHANGE

|   |                         |  |                  |
|---|-------------------------|--|------------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.         |
| LIST OF MATERIALS   |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>CONTRACT 427  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                             |                  |
| DRAWN <i>D. Doherty</i> DATE <i>5 JUL 63</i><br>CHECKED <i>C. F. Poyda</i> <i>8 JUL 63</i><br>APPROVAL <i>D. B. Tait</i> <i>7/24/63</i> |                         | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, ±5% TOL.) |                  |
| APPROVAL <i>W. G. ...</i> <i>7/24/63</i>  |                         | SPECIFICATION CONTROL DRAWING  |                  |
| NASA APPROVAL <i>W. G. ...</i> <i>7/24/63</i>   |                         | CODE IDENT NO.   | NASA DRAWING NO. |
| MIT APPROVAL <i>W. G. ...</i> <i>7/24/63</i>  |                         | SIZE C   | 1010264          |
| SCALE NONE  |                         | WT   | SHEET 1 OF 3     |

|   |           |
|---|-----------|
| UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON |           |
| FRACTIONS DECIMALS ANGLES   |           |
| ± .005 ± .02 ±  |           |
| DO NOT SCALE THIS DRAWING   |           |
| MATERIAL  | SEE NOTES |
| HEAT TREATMENT  | NONE      |
| FINAL FINISH  | NONE      |
| NEXT ASSY   | USED ON   |
| APPLICATION   |           |





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#### DESIGN REQUIREMENTS: (CONTINUED)

**DISSIPATION FACTOR:** 1% MAX FOR CASE SIZES D THRU U (SEE TABLE II) AND 1.5% MAX FOR SIZES A, B, AND C; AT +25°C AND 1000 ± 100 CPS FOR VALUES UP TO 1.0 MFD, AND 60 ± 6 CPS FOR VALUES GREATER THAN 1.0 MFD.

#### INSULATION RESISTANCE:

AT +25°C: 2000 MEGOHM-MICROFARADS MIN. NEED NOT EXCEED 12,000 MEGOHMS. 3000 MEGOHMS MIN. BETWEEN CASE AND EITHER TERMINAL.

AT +125°C:

FOR 200 VDC UNITS:

10 MEGOHM-MICROFARADS MIN. NEED NOT EXCEED 150 MEGOHMS.

FOR 400 AND 600 VDC UNITS:

40 MEGOHM-MICROFARADS MIN. NEED NOT EXCEED 600 MEGOHMS.

**TEMPERATURE COEFFICIENT:** NON LINEAR, REF FIGURE I FOR TYPICAL CAPACITANCE CHANGE VS TEMPERATURE.

**CONSTRUCTION:** PARTS SHALL BE CONSTRUCTED FROM METALIZED PAPER AND A MINERAL WAX IMPREGNATED POLYESTER FILM. THE CASE SHALL BE A METAL AND SEALED. CONNECTIONS SHALL BE SUCH THAT THE PARTS SHALL BE ESSENTIALLY NON-INDUCTIVE.

**LEAD STRENGTH:** LEADS SHALL WITHSTAND A 5 POUND AXIAL PULL FOR 1 MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

**ENVIRONMENTAL:** PER ND 1002045 IN ADDITION TO THE FOLLOWING:

**SEALING TEST:** UNITS SHALL GIVE NO INDICATION OF LEAKAGE WHEN TESTED PER METHOD 512, PROCEDURE I OF MIL-STD-810.

**REDUCED PRESSURE:** UNITS SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10<sup>-4</sup> MM OF MERCURY FOR 96 HOURS.

**LIFE:** MAXIMUM CAPACITANCE CHANGE DURING LIFE TEST PER ND 1002045, PARAGRAPH 4.2.7.1 SHALL BE ± 5%.

#### SPECIAL CONDITIONING BY SUPPLIER:

**BURN-IN:** ALL CAPACITORS SHALL BE BURNED IN FOR 250 HOURS MINIMUM AT RATED WORKING VOLTAGE AT A TEMPERATURE OF +85°C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

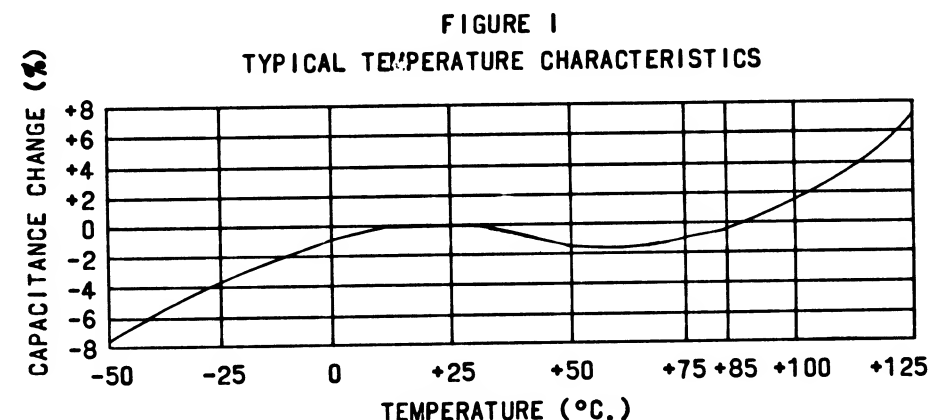
CAPACITANCE

DISSIPATION FACTOR

INSULATION RESISTANCE

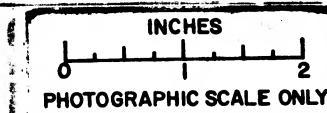
THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.

THE BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT.



Ⓕ REPLACES REV (E) WITH CHANGE

| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.         |
|---|-------------------------|--|------------------|
| LIST OF MATERIALS   |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DWG NO. NAS9-497  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                             |                  |
| DRAWN <i>B. Boland</i> DATE 5/11/63<br>CHECKED <i>C.F. Fajda</i> 8/11/63<br>APPROVAL <i>B. Boland</i> 7/24/63 |                         | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, ±5% TOL.) |                  |
| APPROVAL  |                         | SPECIFICATION CONTROL DRAWING  |                  |
| NASA APPROVAL <i>W. H. H. H.</i> 7/24/63  |                         | CODE IDENT NO.   | NASA DRAWING NO. |
| MIT APPROVAL <i>W. H. H. H.</i> 7/24/63   |                         | C  | 1010264          |
| SCALE   |                         | WT   | SHEET 2 OF 3     |





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| REVISIONS |   |         |          |
|-----------|---|---------|----------|
| SYM       | DESCRIPTION   | DATE    | APPROVAL |
| F         | THIS SHEET ADDED AND UPGRADED TO CLASS A RELEASE PER TDR02210 | 7/24/63 | WK       |

| TABLE I                 |          |                      |          |                      |          |                      |          |                      |
|-------------------------|----------|----------------------|----------|----------------------|----------|----------------------|----------|----------------------|
| CAPACITANCE MICROFARADS | DASH NO. | CASE SIZE SEE NOTE 1 | DASH NO. | CASE SIZE SEE NOTE 1 | DASH NO. | CASE SIZE SEE NOTE 1 | DASH NO. | CASE SIZE SEE NOTE 1 |
| .0010                   | -1       | A                    |          |                      | -75      | C                    |          |                      |
| .0012                   | -2       | A                    |          |                      | -76      | C                    |          |                      |
| .0015                   | -3       | A                    |          |                      | -77      | C                    |          |                      |
| .0018                   | -4       | A                    |          |                      | -78      | C                    |          |                      |
| .0022                   | -5       | A                    |          |                      | -79      | C                    |          |                      |
| .0027                   | -6       | A                    |          |                      | -80      | C                    |          |                      |
| .0033                   | -7       | A                    |          |                      | -81      | C                    |          |                      |
| .0039                   | -8       | A                    |          |                      | -82      | D                    |          |                      |
| .0047                   | -9       | A                    |          |                      | -83      | D                    |          |                      |
| .0056                   | -10      | A                    |          |                      | -84      | D                    |          |                      |
| .0068                   | -11      | A                    |          |                      | -85      | D                    |          |                      |
| .0082                   | -12      | A                    |          |                      | -86      | D                    |          |                      |
| .010                    | -13      | A                    | -47      | D                    | -87      | D                    |          |                      |
| .012                    | -14      | B                    | -48      | D                    | -88      | D                    |          |                      |
| .015                    | -15      | B                    | -49      | D                    | -89      | D                    |          |                      |
| .018                    | -16      | C                    | -50      | D                    | -90      | E                    |          |                      |
| .022                    | -17      | C                    | -51      | D                    | -91      | E                    |          |                      |
| .027                    | -18      | C                    | -52      | E                    | -92      | E                    |          |                      |
| .033                    | -19      | C                    | -53      | E                    | -93      | E                    |          |                      |
| .039                    | -20      | D                    | -54      | G                    | -94      | G                    |          |                      |
| .047                    | -21      | D                    | -55      | G                    | -95      | G                    |          |                      |
| .056                    | -22      | D                    | -56      | G                    | -96      | G                    |          |                      |
| .068                    | -23      | D                    | -57      | G                    | -97      | G                    |          |                      |
| .082                    | -24      | D                    | -58      | H                    | -98      | H                    |          |                      |
| .100                    | -25      | D                    | -59      | H                    | -99      | H                    |          |                      |
| .120                    | -26      | E                    | -60      | H                    | -100     | J                    |          |                      |
| .150                    | -27      | E                    | -61      | H                    | -101     | J                    |          |                      |
| .180                    | -28      | F                    | -62      | K                    | -102     | K                    |          |                      |
| .220                    | -29      | F                    | -63      | K                    | -103     | K                    |          |                      |
| .270                    | -30      | G                    | -64      | L                    | -104     | L                    |          |                      |
| .330                    | -31      | G                    | -65      | L                    | -105     | L                    |          |                      |
| .390                    | -32      | H                    | -66      | M                    | -106     | M                    |          |                      |
| .470                    | -33      | H                    | -67      | M                    | -107     | M                    |          |                      |
| .560                    | -34      | H                    | -68      | N                    | -108     | N                    |          |                      |
| .680                    | -35      | H                    | -69      | N                    | -109     | N                    |          |                      |
| .820                    | -36      | J                    | -70      | P                    | -110     | R                    |          |                      |
| 1.0                     | -37      | J                    | -71      | P                    | -111     | R                    |          |                      |
| 1.5                     | -38      | L                    | -72      | R                    | -112     | R                    |          |                      |
| 2.0                     | -39      | M                    | -73      | R                    | -113     | S                    |          |                      |
| 2.5                     |          |                      |          |                      | -114     | U                    |          |                      |
| 3.0                     | -40      | N                    | -74      | U                    |          |                      |          |                      |
| 4.0                     | -41      | P                    |          |                      |          |                      |          |                      |
| 5.0                     | -42      | R                    |          |                      |          |                      |          |                      |
| 6.0                     | -43      | R                    |          |                      |          |                      |          |                      |
| 8.0                     | -44      | R                    |          |                      |          |                      |          |                      |
| 10.0                    | -45      | T                    |          |                      |          |                      |          |                      |
| 12.0                    | -46      | U                    |          |                      |          |                      |          |                      |

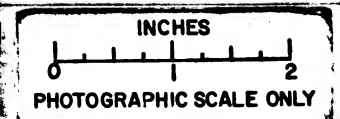
| TABLE II  |       |       |               |
|-----------|-------|-------|---------------|
| CASE SIZE | D     | L     | LEAD DIAMETER |
| A         | .191  | .781  | .020          |
| B         | .211  | .781  | .020          |
| C         | .251  | .781  | .025          |
| D         | .328  | .875  | .025          |
| E         | .328  | 1.093 | .025          |
| F         | .416  | .875  | .032          |
| G         | .416  | 1.093 |               |
| H         | .516  | 1.093 |               |
| J         | .578  | 1.093 |               |
| K         | .578  | 1.406 |               |
| L         | .578  | 1.656 |               |
| M         | .686  | 1.656 |               |
| N         | .686  | 1.906 |               |
| P         | .766  | 1.906 |               |
| R         | 1.016 | 1.906 |               |
| S         | 1.016 | 2.156 |               |
| T         | 1.016 | 2.406 |               |
| U         | 1.016 | 2.656 | .032          |

THE COMPLETE PART NO. IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NO. AND REVISION LETTER.

NOTES:  
1. SEE TABLE II FOR CASE DIAMETER AND LENGTH.

|   |          |        |
|---|----------|--------|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES |          |        |
| TOLERANCES ON                                       |          |        |
| FRACTIONS   | DECIMALS | ANGLES |
| ±   | ±        | ±      |
| DO NOT SCALE THIS DRAWING                           |          |        |
| MATERIAL  |          |        |
| HEAT TREATMENT                                      |          |        |
| FINAL FINISH  |          |        |
| NEXT ASSY   | USED ON  |        |
| APPLICATION   |          |        |

|   |  |                         |  |  |  |              |  |
|---|--|-------------------------|--|--|--|--------------|--|
| QTY REQD  |  | PART OR IDENTIFYING NO. |  | NOMENCLATURE OR DESCRIPTION  |  | FIND NO.     |  |
| LIST OF MATERIALS   |  |                         |  |  |  |              |  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DWG NO. CONTRACT NAS 9-497                                    |  |                         |  | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                             |  |              |  |
| DRAWN <i>D. D. D.</i> DATE 5 JUL 63<br>CHECKED <i>C. F. P.</i> 8 JUL 63<br>APPROVAL <i>A. B. T.</i> 7/24/63 |  |                         |  | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, ±5% TOL.) |  |              |  |
| APPROVAL  |  |                         |  | SPECIFICATION CONTROL DRAWING  |  |              |  |
| NASA APPROVAL <i>W. H. H.</i> 7/24/63   |  |                         |  | CODE IDENT NO.   |  | SIZE         |  |
| MIT APPROVAL <i>W. H. H.</i> 7/24/63  |  |                         |  | C  |  | 1010264      |  |
| SCALE   |  |                         |  | WT   |  | SHEET 3 OF 3 |  |



NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY ASSUMES NO RESPONSIBILITY FOR ANY CLAIMS, DAMAGES, OR LOSSES, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION, TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THEREBY.

# REQUIREMENTS:

## 1. GENERAL:

- INTERPRET DRAWING SYMBOLS, ABBREVIATIONS, AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
- SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
- UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
- PACKAGING AND PACKING: UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING:
  - EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT. LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT. BODY MOUNTING SHALL BE SUCH THAT CAPACITORS CAN BE EASILY GRIPPED BY THE BODY AND REMOVED FROM THE PACKAGE. HANDLING OF LEADS IS TO BE HELD TO A MINIMUM.
- UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-18312 EXCEPT AS SPECIFIED HEREIN.

## 2. INSPECTION AND ACCEPTANCE:

### A. MECHANICAL REQUIREMENTS:

- DIMENSIONS PER OUTLINE AND TABLE II
- LEAD DATA: NICKEL PER ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
- MARKING: PER MIL-STD-130, EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER, AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. THE MANUFACTURER'S PART OR TYPE NUMBER, CAPACITANCE VALUE, TOLERANCE, AND VOLTAGE RATING MAY APPEAR ON THE PART AND PACKAGE. EACH CONTAINER SHALL ALSO INCLUDE THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER.

### B. ELECTRICAL REQUIREMENTS:

- CAPACITANCE: PER TABLE I AT +25°C. AND 1000 ± 100 CPS FOR VALUES UP TO 1.0 MFD AND 60 ± 6 CPS FOR VALUES GREATER THAN 1.0 MFD.
- CAPACITANCE TOLERANCE: ±5% AT +25°C AND 1000 ± 100 CPS FOR VALUES UP TO 1.0 MFD AND 60 ± 6 CPS FOR VALUES GREATER THAN 1.0 MFD.

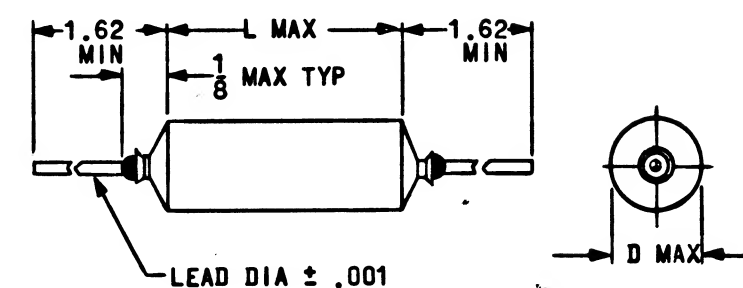
## 3. DESIGN REQUIREMENTS:

- DC WORKING VOLTAGE: PER TABLE AT +125°C.
- OPERATING TEMPERATURE RANGE: -55°C TO +125°C.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

1010264

GRAPHICAL SYMBOL



SEE TABLE II

|                           |         |         |
|---------------------------|---------|---------|
| G                         | G       | G       |
| F                         | F       | F       |
| SHEET 1                   | SHEET 2 | SHEET 3 |
| REVISION STATUS OF SHEETS |         |         |

REPLACES REV(E) WITH CHANGE

|   |                         |  |                  |
|---|-------------------------|--|------------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.         |
| LIST OF MATERIALS   |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DWS. NO. CONTRACT 427   |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                             |                  |
| DRAWN <i>D. Doherty</i> DATE 5 JUL 63<br>CHECKED <i>C. F. Phipps</i> 8 JUL 63<br>APPROVAL <i>D. R. Test</i> 7/24/63 |                         | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, ±5% TOL.) |                  |
| NASA APPROVAL <i>W. K. ...</i> 7/24/63<br>MIT APPROVAL <i>W. K. ...</i> 7/24/63                                     |                         | SPECIFICATION CONTROL DRAWING  |                  |
| HEAT TREATMENT<br>NONE  |                         | CODE IDENT NO.   | NASA DRAWING NO. |
| MATERIAL<br>SEE NOTES   |                         | SIZE<br>C  | 1010264          |
| FINAL FINISH<br>NONE  |                         | SCALE<br>NONE  | WT               |
| APPLICATION   |                         | SHEET 1 OF 3   |                  |

INCHES  
0 1 2  
PHOTOGRAPHIC SCALE ONLY

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#### DESIGN REQUIREMENTS: (CONTINUED)

C. DISSIPATION FACTOR: 1% MAX FOR CASE SIZES D THRU U (SEE TABLE II) AND 1.5% MAX FOR SIZES A, B, AND C; AT +25°C AND 1000 ± 100 CPS FOR VALUES UP TO 1.0 MFD, AND 60 ± 6 CPS FOR VALUES GREATER THAN 1.0 MFD.

#### D. INSULATION RESISTANCE:

(1) AT +25°C: 2000 MEGOHM-MICROFARADS MIN. NEED NOT EXCEED 12,000 MEGOHMS. 3000 MEGOHMS MIN. BETWEEN CASE AND EITHER TERMINAL.

(2) AT +125°C:

(a) FOR 200 VDC UNITS:

10 MEGOHM-MICROFARADS MIN. NEED NOT EXCEED 150 MEGOHMS.

(b) FOR 400 AND 600 VDC UNITS:

40 MEGOHM-MICROFARADS MIN. NEED NOT EXCEED 600 MEGOHMS.

E. TEMPERATURE COEFFICIENT: NON LINEAR, REF FIGURE I FOR TYPICAL CAPACITANCE CHANGE VS TEMPERATURE.

F. CONSTRUCTION: PARTS SHALL BE CONSTRUCTED FROM METALIZED PAPER AND A MINERAL WAX IMPREGNATED POLYESTER FILM. THE CASE SHALL BE A METAL AND SEALED. CONNECTIONS SHALL BE SUCH THAT THE PARTS SHALL BE ESSENTIALLY NON-INDUCTIVE.

G. LEAD STRENGTH: LEADS SHALL WITHSTAND A 5 POUND AXIAL PULL FOR 1 MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

H. ENVIRONMENTAL: PER ND 1002045 IN ADDITION TO THE

(1) FOLLOWING:

(a) SEALING TEST: UNITS SHALL GIVE NO INDICATION OF LEAKAGE WHEN TESTED PER METHOD 512, PROCEDURE I OF MIL-STD-810.

(b) REDUCED PRESSURE: UNITS SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10<sup>-4</sup> MM OF MERCURY FOR 96 HOURS.

(c) LIFE: MAXIMUM CAPACITANCE CHANGE DURING LIFE TEST PER ND 1002045, PARAGRAPH 4.2.7.1 SHALL BE ± 5%.

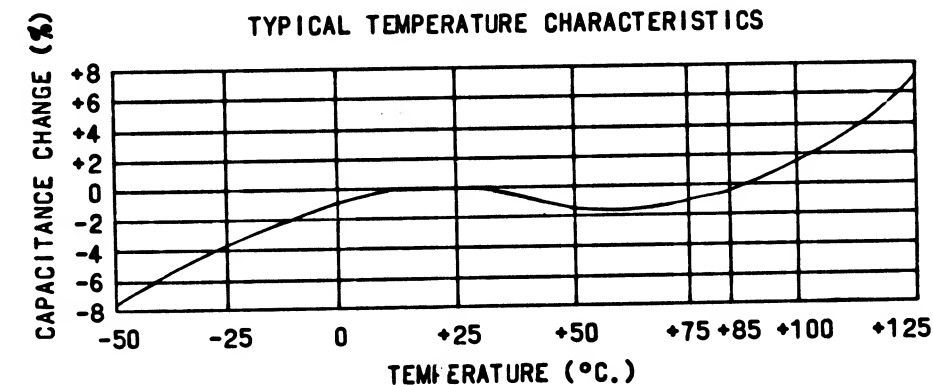
#### 4. SPECIAL CONDITIONING BY SUPPLIER:

A. BURN-IN: ALL CAPACITORS SHALL BE BURNED IN FOR 250 HOURS MINIMUM AT RATED WORKING VOLTAGE AT A TEMPERATURE OF +85°C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:  
CAPACITANCE  
DISSIPATION FACTOR  
INSULATION RESISTANCE

B. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE. THE BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT.

FIGURE I

TYPICAL TEMPERATURE CHARACTERISTICS



Ⓔ REPLACES REV (E) WITH CHANGE

| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO. |
|---|-------------------------|--|----------|
| LIST OF MATERIALS   |                         |  |          |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DWS NO. CONTRACT 497  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                             |          |
| DRAWN <i>B. B. Bell</i> DATE 5/11/64<br>CHECKED <i>C. F. Pender</i> 8/11/63<br>APPROVAL <i>B. B. Bell</i> 7/24/63 |                         | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, ±5% TOL.) |          |
| DO NOT SCALE THIS DRAWING   |                         | SPECIFICATION CONTROL DRAWING  |          |
| MATERIAL  |                         | NASA APPROVAL <i>W. H. H. H.</i> 7/24/63                               |          |
| HEAT TREATMENT  |                         | NASA DRAWING NO. 1010264   |          |
| FINAL FINISH  |                         | CODE IDENT NO. C   |          |
| NEXT ASSY   |                         | SCALE  |          |
| USED ON   |                         | WT   |          |
| APPLICATION   |                         | SHEET 2 OF 3   |          |

INCHES  
0 1 2  
PHOTOGRAPHIC SCALE ONLY



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TABLE I

| CAPACITANCE MICROFARADS | DASH NO. | 200 VDC              |          | 400 VDC              |          | 600 VDC              |          |
|-------------------------|----------|----------------------|----------|----------------------|----------|----------------------|----------|
|                         |          | CASE SIZE SEE NOTE 1 | DASH NO. | CASE SIZE SEE NOTE 1 | DASH NO. | CASE SIZE SEE NOTE 1 | DASH NO. |
| .0010                   | -1       | A                    |          |                      | -75      | C                    |          |
| .0012                   | -2       | A                    |          |                      | -76      | C                    |          |
| .0015                   | -3       | A                    |          |                      | -77      | C                    |          |
| .0018                   | -4       | A                    |          |                      | -78      | C                    |          |
| .0022                   | -5       | A                    |          |                      | -79      | C                    |          |
| .0027                   | -6       | A                    |          |                      | -80      | C                    |          |
| .0033                   | -7       | A                    |          |                      | -81      | C                    |          |
| .0039                   | -8       | A                    |          |                      | -82      | D                    |          |
| .0047                   | -9       | A                    |          |                      | -83      | D                    |          |
| .0056                   | -10      | A                    |          |                      | -84      | D                    |          |
| .0068                   | -11      | A                    |          |                      | -85      | D                    |          |
| .0082                   | -12      | A                    |          |                      | -86      | D                    |          |
| .010                    | -13      | B                    | -47      | D                    | -87      | D                    |          |
| .012                    | -14      | B                    | -48      | D                    | -88      | D                    |          |
| .015                    | -15      | B                    | -49      | D                    | -89      | D                    |          |
| .018                    | -16      | C                    | -50      | D                    | -90      | E                    |          |
| .022                    | -17      | C                    | -51      | D                    | -91      | E                    |          |
| .027                    | -18      | C                    | -52      | E                    | -92      | E                    |          |
| .033                    | -19      | C                    | -53      | E                    | -93      | E                    |          |
| .039                    | -20      | D                    | -54      | G                    | -94      | G                    |          |
| .047                    | -21      | D                    | -55      | G                    | -95      | G                    |          |
| .056                    | -22      | D                    | -56      | G                    | -96      | G                    |          |
| .068                    | -23      | D                    | -57      | G                    | -97      | G                    |          |
| .082                    | -24      | D                    | -58      | H                    | -98      | H                    |          |
| .100                    | -25      | D                    | -59      | H                    | -99      | H                    |          |
| .120                    | -26      | E                    | -60      | H                    | -100     | J                    |          |
| .150                    | -27      | E                    | -61      | H                    | -101     | J                    |          |
| .180                    | -28      | F                    | -62      | K                    | -102     | K                    |          |
| .220                    | -29      | F                    | -63      | K                    | -103     | K                    |          |
| .270                    | -30      | G                    | -64      | L                    | -104     | L                    |          |
| .330                    | -31      | G                    | -65      | L                    | -105     | L                    |          |
| .390                    | -32      | H                    | -66      | M                    | -106     | M                    |          |
| .470                    | -33      | H                    | -67      | M                    | -107     | M                    |          |
| .560                    | -34      | H                    | -68      | N                    | -108     | N                    |          |
| .680                    | -35      | H                    | -69      | N                    | -109     | N                    |          |
| .820                    | -36      | J                    | -70      | P                    | -110     | R                    |          |
| 1.0                     | -37      | J                    | -71      | P                    | -111     | R                    |          |
| 1.5                     | -38      | L                    | -72      | R                    | -112     | R                    |          |
| 2.0                     | -39      | M                    | -73      | R                    | -113     | S                    |          |
| 2.5                     |          |                      |          |                      | -114     | U                    |          |
| 3.0                     | -40      | N                    | -74      | U                    |          |                      |          |
| 4.0                     | -41      | P                    |          |                      |          |                      |          |
| 5.0                     | -42      | R                    |          |                      |          |                      |          |
| 6.0                     | -43      | R                    |          |                      |          |                      |          |
| 8.0                     | -44      | R                    |          |                      |          |                      |          |
| 10.0                    | -45      | T                    |          |                      |          |                      |          |
| 12.0                    | -46      | U                    |          |                      |          |                      |          |
| 2.7                     | -115     | M                    |          |                      |          |                      |          |

NOTES:  
1. SEE TABLE II FOR CASE DIAMETER AND LENGTH.

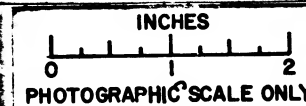
TABLE II

| CASE SIZE | D     | L     | LEAD DIAMETER |
|-----------|-------|-------|---------------|
| A         | .191  | .781  | .020          |
| B         | .211  | .781  | .020          |
| C         | .251  | .781  | .025          |
| D         | .328  | .875  | .025          |
| E         | .328  | 1.093 | .025          |
| F         | .416  | .875  | .032          |
| G         | .416  | 1.093 |               |
| H         | .516  | 1.093 |               |
| J         | .578  | 1.093 |               |
| K         | .578  | 1.406 |               |
| L         | .578  | 1.656 |               |
| M         | .686  | 1.656 |               |
| N         | .686  | 1.906 |               |
| P         | .766  | 1.906 |               |
| R         | 1.016 | 1.906 |               |
| S         | 1.016 | 2.156 |               |
| T         | 1.016 | 2.406 |               |
| U         | 1.016 | 2.656 | .032          |

THE COMPLETE PART NO. IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NO. AND REVISION LETTER.

THIS SHEET ADDED

|  |                         |  |                  |
|--|-------------------------|--|------------------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.         |
| LIST OF MATERIALS  |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DGC NO. 497  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                             |                  |
| DRAWN <i>D. Dolan</i> DATE 5 JUL 63<br>CHECKED <i>C.F. Pridemore</i> 8 JUL 63<br>APPROVAL <i>A.B. Test</i> 7/24/63 |                         | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, ±5% TOL.) |                  |
| APPROVAL   |                         | SPECIFICATION CONTROL DRAWING  |                  |
| NASA APPROVAL <i>W. Michael</i> 7/24/63  |                         | CODE IDENT NO.   | NASA DRAWING NO. |
| MIT APPROVAL <i>W. Pappas</i> 7/24/63  |                         | SIZE<br><b>C</b>   | <b>1010264</b>   |
| SCALE  |                         | WT   | SHEET 3 OF 3     |





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#### REQUIREMENTS:

##### 1. GENERAL:

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- UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
- PACKAGING AND PACKING: UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING:
  - EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT. LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT. BODY MOUNTING SHALL BE SUCH THAT CAPACITORS CAN BE EASILY GRIPPED BY THE BODY AND REMOVED FROM THE PACKAGE. HANDLING OF LEADS IS TO BE HELD TO A MINIMUM.
- UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-18312 EXCEPT AS SPECIFIED HEREIN.

##### 2. INSPECTION AND ACCEPTANCE:

###### A. MECHANICAL REQUIREMENTS:

- DIMENSIONS PER OUTLINE AND TABLE II
- LEAD DATA: NICKEL PER ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
- MARKING: PER MIL-STD-130, EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER, AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. THE MANUFACTURER'S PART OR TYPE NUMBER, CAPACITANCE VALUE, TOLERANCE, AND VOLTAGE RATING MAY APPEAR ON THE PART AND PACKAGE. EACH CONTAINER SHALL ALSO INCLUDE THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER.

###### B. ELECTRICAL REQUIREMENTS:

- CAPACITANCE: PER TABLE I AT +25°C. AND  $1000 \pm 100$  CPS FOR VALUES UP TO 1.0 MFD AND  $60 \pm 6$  CPS FOR VALUES GREATER THAN 1.0 MFD.
- CAPACITANCE TOLERANCE:  $\pm 5\%$  AT +25°C AND  $1000 \pm 100$  CPS FOR VALUES UP TO 1.0 MFD AND  $60 \pm 6$  CPS FOR VALUES GREATER THAN 1.0 MFD.

##### 3. DESIGN REQUIREMENTS:

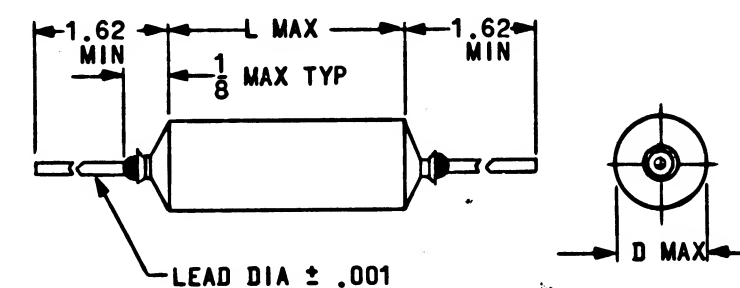
- DC WORKING VOLTAGE: PER TABLE AT +125°C.
- OPERATING TEMPERATURE RANGE: -55°C TO +125°C.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

H 1010264

GRAPHICAL SYMBOL

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| F         | REPLACES REV E WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02210 | 7/24/63 | WLC      |
| G         | REVISED PER TDRR 04531   | 8/12/63 | WLC      |
| H         | REVISED PER TDRR 04957   | 12/3/63 | WLC      |

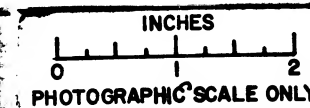


SEE TABLE II

|                           |         |         |
|---------------------------|---------|---------|
| H                         | G       | H       |
| G                         | G       | G       |
| F                         | F       | F       |
| SHEET 1                   | SHEET 2 | SHEET 3 |
| REVISION STATUS OF SHEETS |         |         |

REPLACES REV(E) WITH CHANGE

|  |                         |  |                  |
|--|-------------------------|--|------------------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.         |
| LIST OF MATERIALS  |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DWC NO. CONTRACT 427                             |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                                   |                  |
| DRAWN D. Doherty DATE 5 JUL 63<br>CHECKED C. F. Poirer 8 JUL 63<br>APPROVAL A. R. Test 7/24/63 |                         | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, $\pm 5\%$ TOL.) |                  |
| APPROVAL   |                         | SPECIFICATION CONTROL DRAWING  |                  |
| NASA APPROVAL [Signature] 7/24/63  |                         | CODE IDENT NO.   | NASA DRAWING NO. |
| MIT APPROVAL [Signature] 7/24/63   |                         | C  | 1010264          |
| SCALE NONE   |                         | WT   | SHEET 1 OF 3     |



NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

TABLE I

| CAPACITANCE MICROFARADS | DASH NO. | 200 VDC              |          | 400 VDC              |          | 600 VDC              |          |
|-------------------------|----------|----------------------|----------|----------------------|----------|----------------------|----------|
|                         |          | CASE SIZE SEE NOTE 1 | DASH NO. | CASE SIZE SEE NOTE 1 | DASH NO. | CASE SIZE SEE NOTE 1 | DASH NO. |
| .0010                   | -1       | A                    |          |                      | -75      | C                    |          |
| .0012                   | -2       | A                    |          |                      | -76      | C                    |          |
| .0015                   | -3       | A                    |          |                      | -77      | C                    |          |
| .0018                   | -4       | A                    |          |                      | -78      | C                    |          |
| .0022                   | -5       | A                    |          |                      | -79      | C                    |          |
| .0027                   | -6       | A                    |          |                      | -80      | C                    |          |
| .0033                   | -7       | A                    |          |                      | -81      | C                    |          |
| .0039                   | -8       | A                    |          |                      | -82      | D                    |          |
| .0047                   | -9       | A                    |          |                      | -83      | D                    |          |
| .0056                   | -10      | A                    |          |                      | -84      | D                    |          |
| .0068                   | -11      | A                    |          |                      | -85      | D                    |          |
| .0082                   | -12      | A                    |          |                      | -86      | D                    |          |
| .010                    | -13      | A                    | -47      | D                    | -87      | D                    |          |
| .012                    | -14      | B                    | -48      | D                    | -88      | D                    |          |
| .015                    | -15      | B                    | -49      | D                    | -89      | D                    |          |
| .018                    | -16      | C                    | -50      | D                    | -90      | E                    |          |
| .022                    | -17      | C                    | -51      | D                    | -91      | E                    |          |
| .027                    | -18      | C                    | -52      | E                    | -92      | E                    |          |
| .033                    | -19      | C                    | -53      | E                    | -93      | E                    |          |
| .039                    | -20      | D                    | -54      | G                    | -94      | G                    |          |
| .047                    | -21      | D                    | -55      | G                    | -95      | G                    |          |
| .056                    | -22      | D                    | -56      | G                    | -96      | G                    |          |
| .068                    | -23      | D                    | -57      | G                    | -97      | G                    |          |
| .082                    | -24      | D                    | -58      | H                    | -98      | H                    |          |
| .100                    | -25      | D                    | -59      | H                    | -99      | H                    |          |
| .120                    | -26      | E                    | -60      | H                    | -100     | J                    |          |
| .150                    | -27      | E                    | -61      | H                    | -101     | J                    |          |
| .180                    | -28      | F                    | -62      | K                    | -102     | K                    |          |
| .220                    | -29      | F                    | -63      | K                    | -103     | K                    |          |
| .270                    | -30      | G                    | -64      | L                    | -104     | L                    |          |
| .330                    | -31      | G                    | -65      | L                    | -105     | L                    |          |
| .390                    | -32      | H                    | -66      | M                    | -106     | M                    |          |
| .470                    | -33      | H                    | -67      | M                    | -107     | M                    |          |
| .560                    | -34      | H                    | -68      | N                    | -108     | N                    |          |
| .680                    | -35      | H                    | -69      | N                    | -109     | N                    |          |
| .820                    | -36      | J                    | -70      | P                    | -110     | R                    |          |
| 1.0                     | -37      | J                    | -71      | P                    | -111     | R                    |          |
| 1.5                     | -38      | L                    | -72      | R                    | -112     | R                    |          |
| 2.0                     | -39      | M                    | -73      | R                    | -113     | S                    |          |
| 2.5                     |          |                      |          |                      | -114     | U                    |          |
| 3.0                     | -40      | N                    | -74      | U                    |          |                      |          |
| 4.0                     | -41      | P                    |          |                      |          |                      |          |
| 5.0                     | -42      | R                    |          |                      |          |                      |          |
| 6.0                     | -43      | R                    |          |                      |          |                      |          |
| 8.0                     | -44      | R                    |          |                      |          |                      |          |
| 10.0                    | -45      | T                    |          |                      |          |                      |          |
| 12.0                    | -46      | U                    |          |                      |          |                      |          |
| 2.7                     | -115     | M                    |          |                      |          |                      |          |
| 1.25                    | -116     | L                    |          |                      |          |                      |          |

NOTES:

1. SEE TABLE II FOR CASE DIAMETER AND LENGTH.

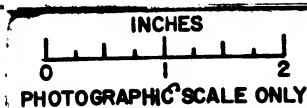
TABLE II

| CASE SIZE | D     | L     | LEAD DIAMETER |
|-----------|-------|-------|---------------|
| A         | .191  | .781  | .020          |
| B         | .211  | .781  | .020          |
| C         | .251  | .781  | .025          |
| D         | .328  | .875  | .025          |
| E         | .328  | 1.093 | .025          |
| F         | .416  | .875  | .032          |
| G         | .416  | 1.093 |               |
| H         | .516  | 1.093 |               |
| J         | .578  | 1.093 |               |
| K         | .578  | 1.406 |               |
| L         | .578  | 1.656 |               |
| M         | .686  | 1.656 |               |
| N         | .686  | 1.906 |               |
| P         | .766  | 1.906 |               |
| R         | 1.016 | 1.906 |               |
| S         | 1.016 | 2.156 |               |
| T         | 1.016 | 2.406 |               |
| U         | 1.016 | 2.656 | .032          |

THE COMPLETE PART NO. IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NO. AND REVISION LETTER.

THIS SHEET ADDED

|  |                         |  |                  |
|--|-------------------------|--|------------------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.         |
| LIST OF MATERIALS  |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DWC NO. <i>497</i><br>CONTRACT <i>497</i>  |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                             |                  |
| DRAWN <i>D. Doherty</i> DATE <i>5 JUL 63</i><br>CHECKED <i>C. F. Pender</i> <i>8 JUL 63</i><br>APPROVAL <i>A. B. Test</i> <i>7/24/63</i> |                         | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, ±5% TOL.) |                  |
| APPROVAL   |                         | SPECIFICATION CONTROL DRAWING  |                  |
| NASA APPROVAL <i>W. H. Haffner</i> <i>7/24/63</i>  |                         | CODE IDENT NO.   | NASA DRAWING NO. |
| MIT APPROVAL <i>W. H. Haffner</i> <i>7/24/63</i>   |                         | SIZE<br><b>C</b>   | <b>1010264</b>   |
| SCALE  |                         | WT   | SHEET 3 OF 3     |



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REQUIREMENTS:

1. GENERAL:

- A. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS, AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
- B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
- C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
- D. PACKAGING AND PACKING: UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING:
- (1) EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT. LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT. BODY MOUNTING SHALL BE SUCH THAT CAPACITORS CAN BE EASILY GRIPPED BY THE BODY AND REMOVED FROM THE PACKAGE. HANDLING OF LEADS IS TO BE HELD TO A MINIMUM.
- E. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-18312 EXCEPT AS SPECIFIED HEREIN.

2. INSPECTION AND ACCEPTANCE:

A. MECHANICAL REQUIREMENTS:

- (1) DIMENSIONS PER OUTLINE AND TABLE II
- (2) LEAD DATA: NICKEL PER ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
- (3) MARKING: PER ND1002019 EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER, AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. THE MANUFACTURER'S PART OR TYPE NUMBER, CAPACITANCE VALUE, TOLERANCE, AND VOLTAGE RATING MAY APPEAR ON THE PART AND PACKAGE. EACH CONTAINER SHALL ALSO INCLUDE THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER.

B. ELECTRICAL REQUIREMENTS:

- (1) CAPACITANCE: PER TABLE I AT +25°C. AND 1000 ± 100 CPS FOR VALUES UP TO 1.0 MFD AND 60 ± 6 CPS FOR VALUES GREATER THAN 1.0 MFD.
- (2) CAPACITANCE TOLERANCE: ±5% AT +25°C AND 1000 ± 100 CPS FOR VALUES UP TO 1.0 MFD AND 60 ± 6 CPS FOR VALUES GREATER THAN 1.0 MFD.

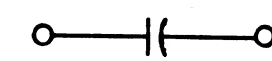
3. DESIGN REQUIREMENTS:

- A. DC WORKING VOLTAGE: PER TABLE AT +125°C.
- B. OPERATING TEMPERATURE RANGE: -55°C TO +125°C.

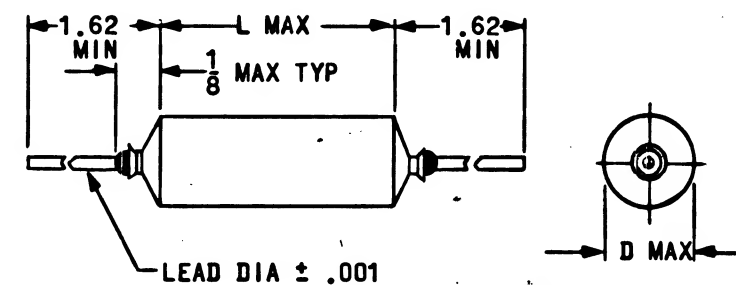
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

1010264

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| F         | REPLACES REV E WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02210 | 7/24/63 | WIK      |
| G         | REVISED PER TDRR 04531   | 8/14/63 | PAK WIK  |
| H         | REVISED PER TDRR 04957   | 10/3/63 | PAK WIK  |
| J         | REVISED PER TDRR 05977   | 2/4/64  | PAK WIK  |



GRAPHICAL SYMBOL

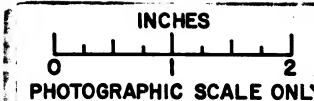


SEE TABLE II

|                           |         |         |
|---------------------------|---------|---------|
| J                         | G       | J       |
| H                         | G       | H       |
| G                         | G       | G       |
| F                         | F       | F       |
| SHEET 1                   | SHEET 2 | SHEET 3 |
| REVISION STATUS OF SHEETS |         |         |

REPLACES REV(E) WITH CHANGE

|   |                         |  |               |
|---|-------------------------|--|---------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.      |
| LIST OF MATERIALS   |                         |  |               |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DWS NO. CONTRACT 427                            |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                             |               |
| DRAWN D. Doffert DATE 5 JUL 63<br>CHECKED C. F. Pardo 8 JUL 63<br>APPROVAL D. A. Test 7/24/63 |                         | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, ±5% TOL.) |               |
| NASA APPROVAL [Signature] 7/24/63<br>MIT APPROVAL [Signature] 7/24/63                         |                         | SPECIFICATION CONTROL DRAWING<br>NASA DRAWING NO.<br>1010264           |               |
| CODE IDENT NO.  |                         | SIZE<br>C  | SCALE NONE WT |
| SHEET 1 OF 3  |                         |  |               |



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TABLE I

| CAPACITANCE<br>MICROFARADS | 200 VDC     |  | CASE<br>SIZE<br>SEE<br>NOTE 1 | 400 VDC     |  | CASE<br>SIZE<br>SEE<br>NOTE 1 | 600 VDC     |  | CASE<br>SIZE<br>SEE<br>NOTE 1 |
|----------------------------|-------------|--|-------------------------------|-------------|--|-------------------------------|-------------|--|-------------------------------|
|                            | DASH<br>NO. |  |                               | DASH<br>NO. |  |                               | DASH<br>NO. |  |                               |
| .0010                      | -1          |  | A                             |             |  |                               | -75         |  | C                             |
| .0012                      | -2          |  | A                             |             |  |                               | -76         |  | C                             |
| .0015                      | -3          |  | A                             |             |  |                               | -77         |  | C                             |
| .0018                      | -4          |  | A                             |             |  |                               | -78         |  | C                             |
| .0022                      | -5          |  | A                             |             |  |                               | -79         |  | C                             |
| .0027                      | -6          |  | A                             |             |  |                               | -80         |  | C                             |
| .0033                      | -7          |  | A                             |             |  |                               | -81         |  | C                             |
| .0039                      | -8          |  | A                             |             |  |                               | -82         |  | D                             |
| .0047                      | -9          |  | A                             |             |  |                               | -83         |  | D                             |
| .0056                      | -10         |  | A                             |             |  |                               | -84         |  | D                             |
| .0068                      | -11         |  | A                             |             |  |                               | -85         |  | D                             |
| .0082                      | -12         |  | A                             |             |  |                               | -86         |  | D                             |
| .010                       | -13         |  | A                             | -47         |  | D                             | -87         |  | D                             |
| .012                       | -14         |  | B                             | -48         |  | D                             | -88         |  | D                             |
| .015                       | -15         |  | B                             | -49         |  | D                             | -89         |  | D                             |
| .018                       | -16         |  | C                             | -50         |  | D                             | -90         |  | E                             |
| .022                       | -17         |  | C                             | -51         |  | D                             | -91         |  | E                             |
| .027                       | -18         |  | C                             | -52         |  | E                             | -92         |  | E                             |
| .033                       | -19         |  | C                             | -53         |  | E                             | -93         |  | E                             |
| .039                       | -20         |  | D                             | -54         |  | G                             | -94         |  | G                             |
| .047                       | -21         |  | D                             | -55         |  | G                             | -95         |  | G                             |
| .056                       | -22         |  | D                             | -56         |  | G                             | -96         |  | G                             |
| .068                       | -23         |  | D                             | -57         |  | G                             | -97         |  | G                             |
| .082                       | -24         |  | D                             | -58         |  | H                             | -98         |  | H                             |
| .100                       | -25         |  | D                             | -59         |  | H                             | -99         |  | H                             |
| .120                       | -26         |  | E                             | -60         |  | H                             | -100        |  | J                             |
| .150                       | -27         |  | E                             | -61         |  | H                             | -101        |  | J                             |
| .180                       | -28         |  | F                             | -62         |  | K                             | -102        |  | K                             |
| .220                       | -29         |  | F                             | -63         |  | K                             | -103        |  | K                             |
| .270                       | -30         |  | G                             | -64         |  | L                             | -104        |  | L                             |
| .330                       | -31         |  | G                             | -65         |  | L                             | -105        |  | L                             |
| .390                       | -32         |  | H                             | -66         |  | M                             | -106        |  | M                             |
| .470                       | -33         |  | H                             | -67         |  | M                             | -107        |  | M                             |
| .560                       | -34         |  | H                             | -68         |  | N                             | -108        |  | N                             |
| .680                       | -35         |  | H                             | -69         |  | N                             | -109        |  | N                             |
| .820                       | -36         |  | J                             | -70         |  | P                             | -110        |  | R                             |
| 1.0                        | -37         |  | J                             | -71         |  | P                             | -111        |  | R                             |
| 1.5                        | -38         |  | L                             | -72         |  | R                             | -112        |  | R                             |
| 2.0                        | -39         |  | M                             | -73         |  | R                             | -113        |  | S                             |
| 2.5                        |             |  |                               |             |  |                               | -114        |  | U                             |
| 3.0                        | -40         |  | N                             | -74         |  | U                             |             |  |                               |
| 4.0                        | -41         |  | P                             |             |  |                               |             |  |                               |
| 5.0                        | -42         |  | R                             |             |  |                               |             |  |                               |
| 6.0                        | -43         |  | R                             |             |  |                               |             |  |                               |
| 8.0                        | -44         |  | R                             |             |  |                               |             |  |                               |
| 10.0                       | -45         |  | T                             |             |  |                               |             |  |                               |
| 12.0                       | -46         |  | U                             |             |  |                               |             |  |                               |
| 2.7                        | -115        |  | N                             |             |  |                               |             |  |                               |
| 1.25                       | -116        |  | L                             |             |  |                               |             |  |                               |

NOTES:

1. SEE TABLE II FOR CASE DIAMETER AND LENGTH.

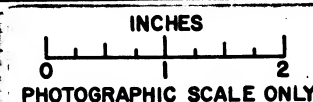
TABLE II

| CASE<br>SIZE | D     | L     | LEAD<br>DIAMETER |
|--------------|-------|-------|------------------|
| A            | .191  | .781  | .020             |
| B            | .211  | .781  | .020             |
| C            | .251  | .781  | .025             |
| D            | .328  | .875  | .025             |
| E            | .328  | 1.093 | .025             |
| F            | .416  | .875  | .032             |
| G            | .416  | 1.093 |                  |
| H            | .516  | 1.093 |                  |
| J            | .578  | 1.093 |                  |
| K            | .578  | 1.406 |                  |
| L            | .578  | 1.656 |                  |
| M            | .686  | 1.656 |                  |
| N            | .686  | 1.906 |                  |
| P            | .766  | 1.906 |                  |
| R            | 1.016 | 1.906 |                  |
| S            | 1.016 | 2.156 |                  |
| T            | 1.016 | 2.406 |                  |
| U            | 1.016 | 2.656 |                  |

THE COMPLETE PART NO. IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NO. AND REVISION LETTER.

THIS SHEET ADDED

|  |                            |  |                  |
|--|----------------------------|--|------------------|
| QTY<br>REQD  | PART OR<br>IDENTIFYING NO. | NOMENCLATURE OR<br>DESCRIPTION   | FIND<br>NO.      |
| LIST OF MATERIALS  |                            |  |                  |
| MIT<br>INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DWE NO. CONTRACT 497  |                            | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                             |                  |
| DRAWN <i>D. DeLong</i> DATE 5 JUL 63<br>CHECKED <i>C. J. Pinder</i> 8 JUL 63<br>APPROVAL <i>A. A. Test</i> 7/24/63 |                            | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, ±5% TOL.) |                  |
| APPROVAL   |                            | SPECIFICATION CONTROL DRAWING  |                  |
| NASA APPROVAL <i>W. H. L. 7/24/63</i>  |                            | CODE IDENT NO.   | NASA DRAWING NO. |
| MIT APPROVAL <i>W. H. L. 7/24/63</i>   |                            | C  | 1010264          |
| SCALE  |                            | WT   | SHEET 3 OF 3     |





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# REQUIREMENTS:

## 1. GENERAL:

- INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED IN MIL-D-70327.
- SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
- UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
- PACKAGING AND PACKING: UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING:
  - EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT. LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT. BODY MOUNTING SHALL BE SUCH THAT CAPACITORS CAN BE EASILY GRIPPED BY THE BODY AND REMOVED FROM THE PACKAGE. HANDLING OF LEADS IS TO BE HELD TO A MINIMUM.
- UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-18312 EXCEPT AS SPECIFIED HEREIN.

## 2. INSPECTION AND ACCEPTANCE:

### A. MECHANICAL REQUIREMENTS:

- DIMENSIONS PER OUTLINE AND TABLE II
- LEAD DATA: NICKEL PER ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
- MARKING: PER ND1002019 EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER, AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. THE MANUFACTURER'S PART OR TYPE NUMBER, CAPACITANCE VALUE, TOLERANCE, AND VOLTAGE RATING MAY APPEAR ON THE PART AND PACKAGE. EACH CONTAINER SHALL ALSO INCLUDE THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER.

### B. ELECTRICAL REQUIREMENTS:

- CAPACITANCE: PER TABLE I AT +25°C. AND  $1000 \pm 100$  CPS FOR VALUES UP TO 1.0 MFD AND  $60 \pm 6$  CPS FOR VALUES GREATER THAN 1.0 MFD.
- CAPACITANCE TOLERANCE:  $\pm 5\%$  AT +25°C AND  $1000 \pm 100$  CPS FOR VALUES UP TO 1.0 MFD AND  $60 \pm 6$  CPS FOR VALUES GREATER THAN 1.0 MFD.

## 3. DESIGN REQUIREMENTS:

- DC WORKING VOLTAGE: PER TABLE AT +125°C.
- OPERATING TEMPERATURE RANGE: -55°C TO +125°C.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

1010264 K

### REVISIONS

| SYM | DESCRIPTION  | DATE        | APPROVAL |
|-----|--|-------------|----------|
| F   | REPLACES REV E WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02210 | 7/24/63 WLC |          |
| G   | REVISED PER TDRR 04331   | 4/12/63 WLC |          |
| H   | REVISED PER TDRR 04957   | 12/3/63 WLC |          |
| J   | REVISED PER TDRR 05977   | 2/4/64 WLC  |          |
| K   | REVISED PER TDRR 08894   | 4/14/64 WLC |          |

FIGURE 2

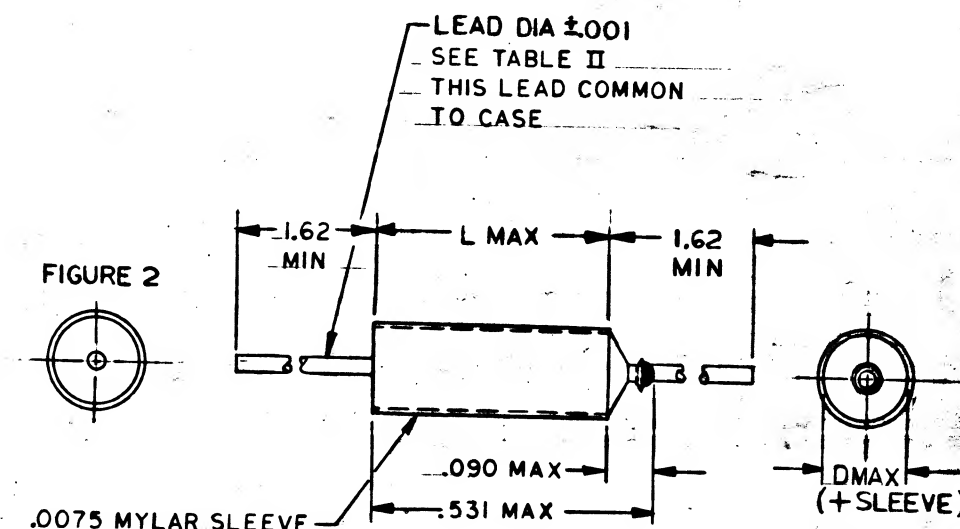
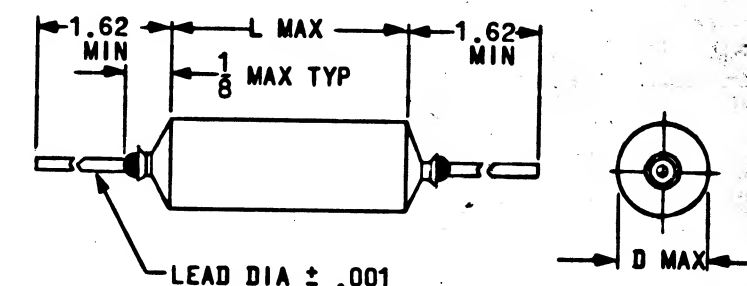
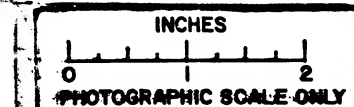


FIGURE 1



## REPLACES REV(E) WITH CHANGE

|  |                         |  |                  |
|--|-------------------------|--|------------------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.         |
| LIST OF MATERIALS  |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>CONTRACT 497                                     |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                                   |                  |
| DRAWN D. Doherty DATE 5 JUL 63<br>CHECKED C. F. Ponder 8 JUL 63<br>APPROVAL D. R. Tait 7/24/63 |                         | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, $\pm 5\%$ TOL.) |                  |
| NASA APPROVAL [Signature] 7/24/63  |                         | CODE IDENT NO.   | NASA DRAWING NO. |
| MIT APPROVAL [Signature] 7/24/63   |                         | C  | 1010264          |
| SCALE NONE   |                         | WT   | SHEET 1 OF 3     |



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#### DESIGN REQUIREMENTS: (CONTINUED)

C. DISSIPATION FACTOR: 1% MAX FOR CASE SIZES D THRU U (SEE TABLE II) AND 1.5% MAX FOR SIZES A, B, AND C; AT +25°C AND 1000 ± 100 CPS FOR VALUES UP TO 1.0 MFD, AND 60 ± 6 CPS FOR VALUES GREATER THAN 1.0 MFD.

#### D. INSULATION RESISTANCE:

(1) AT +25°C: 2000 MEGOHM-MICROFARADS MIN. NEED NOT EXCEED 12,000 MEGOHMS. 3000 MEGOHMS MIN. BETWEEN CASE AND EITHER TERMINAL.

(2) AT +125°C:

(a) FOR 200 VDC UNITS:

10 MEGOHM-MICROFARADS MIN. NEED NOT EXCEED 150 MEGOHMS.

(b) FOR 400 AND 600 VDC UNITS:

40 MEGOHM-MICROFARADS MIN. NEED NOT EXCEED 600 MEGOHMS.

E. TEMPERATURE COEFFICIENT: NON LINEAR, REF FIGURE I FOR TYPICAL CAPACITANCE CHANGE VS TEMPERATURE.

F. CONSTRUCTION: PARTS SHALL BE CONSTRUCTED FROM METALIZED PAPER AND A MINERAL WAX IMPREGNATED POLYESTER FILM. THE CASE SHALL BE A METAL AND SEALED. CONNECTIONS SHALL BE SUCH THAT THE PARTS SHALL BE ESSENTIALLY NON-INDUCTIVE.

G. LEAD STRENGTH: LEADS SHALL WITHSTAND A 5 POUND AXIAL PULL FOR 1 MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

H. ENVIRONMENTAL: PER ND 1002045 IN ADDITION TO THE FOLLOWING:

(a) SEALING TEST: UNITS SHALL GIVE NO INDICATION OF LEAKAGE WHEN TESTED PER METHOD 512, PROCEDURE I OF MIL-STD-810.

(b) REDUCED PRESSURE: UNITS SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10<sup>-4</sup> MM OF MERCURY FOR 96 HOURS.

(c) LIFE: MAXIMUM CAPACITANCE CHANGE DURING LIFE TEST PER ND 1002045, PARAGRAPH 4.2.7.1 SHALL BE ± 5%.

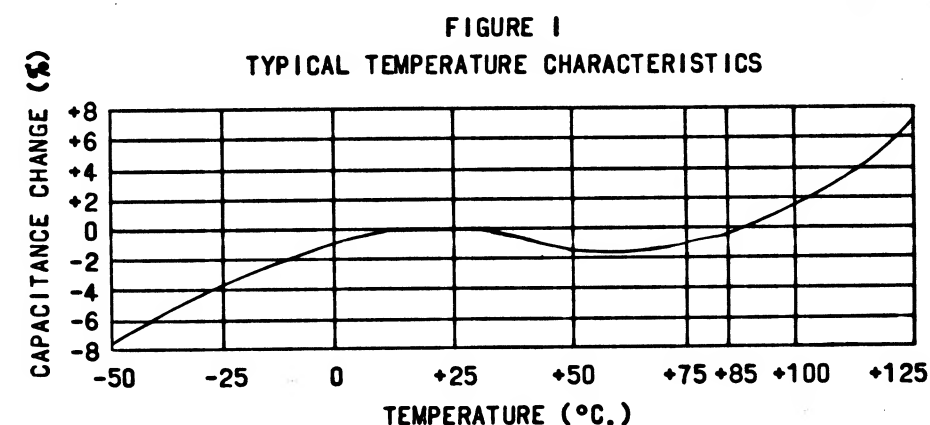
#### 4. SPECIAL CONDITIONING BY SUPPLIER:

A. BURN-IN: ALL CAPACITORS SHALL BE BURNED IN FOR 250 HOURS MINIMUM AT RATED WORKING VOLTAGE AT A TEMPERATURE OF +85°C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN: CAPACITANCE DISSIPATION FACTOR INSULATION RESISTANCE

B. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE. THE BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT.

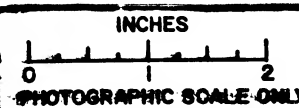
1010264

| REVISIONS |  |          |          |
|-----------|--|----------|----------|
| SYM       | DESCRIPTION  | DATE     | APPROVAL |
| F         | REPLACES REV E WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02210 | 7/24/63  | WIK      |
| G         | REVISED PER TDRR 04551   | 11/14/63 | WIK      |
| H         | REVISED PER TDRR 04957   |          |          |
| J         | REVISED PER TDRR 05977   |          |          |
|           | REVISED PER TDRR 08844   | 9/24/64  | WIK      |



Ⓕ REPLACES REV (E) WITH CHANGE

|  |                         |  |   |
|--|-------------------------|--|---|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.  |
| LIST OF MATERIALS  |                         |  |   |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DWS NO. CONTRACT 427   |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                             |   |
| DRAWN <i>B. B. B.</i> DATE 5/11/64<br>CHECKED <i>C. F. F.</i> DATE 8/11/63<br>APPROVAL <i>B. B. B.</i> 7/24/63 |                         | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, ±5% TOL.) |   |
| DO NOT SCALE THIS DRAWING  |                         | SPECIFICATION CONTROL DRAWING  |   |
| MATERIAL   |                         | NASA APPROVAL <i>W. H. H.</i> 7/24/63                                  | CODE IDENT NO. SIZE NASA DRAWING NO.<br>C 1010264 |
| HEAT TREATMENT   |                         | MIT APPROVAL <i>W. H. H.</i> 7/24/63                                   | SCALE WT SHEET 2 OF 3                             |
| FINAL FINISH   |                         |  |   |
| NEXT ASSY  | USED ON                 |  |   |
| APPLICATION  |                         |  |   |



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TABLE I

| CAPACITANCE MICROFARADS | DASH NO. | 200 VDC              |          | 400 VDC              |          | 600 VDC              |          |
|-------------------------|----------|----------------------|----------|----------------------|----------|----------------------|----------|
|                         |          | CASE SIZE SEE NOTE 1 | DASH NO. | CASE SIZE SEE NOTE 1 | DASH NO. | CASE SIZE SEE NOTE 1 | DASH NO. |
| .0010                   | -1       | A                    |          |                      | -75      | C                    |          |
| .0012                   | -2       | A                    |          |                      | -76      | C                    |          |
| .0015                   | -3       | A                    |          |                      | -77      | C                    |          |
| .0018                   | -4       | A                    |          |                      | -78      | C                    |          |
| .0022                   | -5       | A                    |          |                      | -79      | C                    |          |
| .0027                   | -6       | A                    |          |                      | -80      | C                    |          |
| .0033                   | -7       | A                    |          |                      | -81      | C                    |          |
| .0039                   | -8       | A                    |          |                      | -82      | D                    |          |
| .0047                   | -9       | A                    |          |                      | -83      | D                    |          |
| .0056                   | -10      | A                    |          |                      | -84      | D                    |          |
| .0068                   | -11      | A                    |          |                      | -85      | D                    |          |
| .0082                   | -12      | A                    |          |                      | -86      | D                    |          |
| .010                    | -13      | A                    | -47      | D                    | -87      | D                    |          |
| .012                    | -14      | B                    | -48      | D                    | -88      | D                    |          |
| .015                    | -15      | B                    | -49      | D                    | -89      | D                    |          |
| .018                    | -16      | C                    | -50      | D                    | -90      | E                    |          |
| .022                    | -17      | C                    | -51      | D                    | -91      | E                    |          |
| .027                    | -18      | C                    | -52      | E                    | -92      | E                    |          |
| .033                    | -19      | C                    | -53      | E                    | -93      | E                    |          |
| .039                    | -20      | D                    | -54      | G                    | -94      | G                    |          |
| .047                    | -21      | D                    | -55      | G                    | -95      | G                    |          |
| .056                    | -22      | D                    | -56      | G                    | -96      | G                    |          |
| .068                    | -23      | D                    | -57      | G                    | -97      | G                    |          |
| .082                    | -24      | D                    | -58      | H                    | -98      | H                    |          |
| .100                    | -25      | D                    | -59      | H                    | -99      | H                    |          |
| .120                    | -26      | E                    | -60      | H                    | -100     | J                    |          |
| .150                    | -27      | E                    | -61      | H                    | -101     | J                    |          |
| .180                    | -28      | F                    | -62      | K                    | -102     | K                    |          |
| .220                    | -29      | F                    | -63      | K                    | -103     | K                    |          |
| .270                    | -30      | G                    | -64      | L                    | -104     | L                    |          |
| .330                    | -31      | G                    | -65      | L                    | -105     | L                    |          |
| .390                    | -32      | H                    | -66      | M                    | -106     | M                    |          |
| .470                    | -33      | H                    | -67      | M                    | -107     | M                    |          |
| .560                    | -34      | H                    | -68      | N                    | -108     | N                    |          |
| .680                    | -35      | H                    | -69      | N                    | -109     | N                    |          |
| .820                    | -36      | J                    | -70      | P                    | -110     | R                    |          |
| 1.0                     | -37      | J                    | -71      | P                    | -111     | R                    |          |
| 1.5                     | -38      | L                    | -72      | R                    | -112     | R                    |          |
| 2.0                     | -39      | M                    | -73      | R                    | -113     | S                    |          |
| 2.5                     |          |                      |          |                      | -114     | U                    |          |
| 3.0                     | -40      | N                    | -74      | U                    |          |                      |          |
| 4.0                     | -41      | P                    |          |                      |          |                      |          |
| 5.0                     | -42      | R                    |          |                      |          |                      |          |
| 6.0                     | -43      | R                    |          |                      |          |                      |          |
| 8.0                     | -44      | R                    |          |                      |          |                      |          |
| 10.0                    | -45      | T                    |          |                      |          |                      |          |
| 12.0                    | -46      | U                    |          |                      |          |                      |          |
| 2.7                     | -115     | N                    |          |                      |          |                      |          |
| 1.25                    | -116     | L                    |          |                      |          |                      |          |
| 0.027                   | -117     | V                    |          |                      |          |                      |          |

NOTES:

1. SEE TABLE II FOR CASE DIAMETER AND LENGTH.

TABLE II

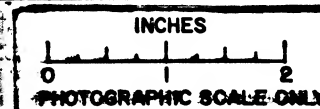
| CASE SIZE | D     | L     | LEAD DIAMETER |
|-----------|-------|-------|---------------|
| A         | .191  | .781  | .020          |
| B         | .211  | .781  | .020          |
| C         | .251  | .781  | .025          |
| D         | .328  | .875  | .025          |
| E         | .328  | 1.093 | .025          |
| F         | .416  | .875  | .032          |
| G         | .416  | 1.093 |               |
| H         | .516  | 1.093 |               |
| J         | .578  | 1.093 |               |
| K         | .578  | 1.406 |               |
| L         | .578  | 1.656 |               |
| M         | .686  | 1.656 |               |
| N         | .686  | 1.906 |               |
| P         | .766  | 1.906 |               |
| R         | 1.016 | 1.906 |               |
| S         | 1.016 | 2.156 |               |
| T         | 1.016 | 2.406 |               |
| U         | 1.016 | 2.656 | .032          |
| V         | .250  | .437  | .025          |

FIGURE II

THE COMPLETE PART NO. IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NO. AND REVISION LETTER.

THIS SHEET ADDED

|   |                         |  |                       |
|---|-------------------------|--|-----------------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.              |
| LIST OF MATERIALS   |                         |  |                       |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE MASS<br>DWS NO. CONTRACT 497   |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                             |                       |
| DRAWN <i>D. DeLong</i> DATE <i>5 JUL 63</i><br>CHECKED <i>C.F. Pijda</i> <i>8 JUL 63</i><br>APPROVAL <i>W. G. Test</i> <i>7/24/63</i><br>APPROVAL |                         | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, ±5% TOL.) |                       |
| NASA APPROVAL <i>W. G. Test</i> <i>7/24/63</i><br>MIT APPROVAL <i>W. G. Test</i> <i>7/24/63</i>   |                         | SPECIFICATION CONTROL DRAWING<br>NASA DRAWING NO.<br>1010264           |                       |
| NEXT ASSY USED ON APPLICATION   |                         | CODE IDENT NO. SIZE<br>C   | SCALE WT SHEET 3 OF 3 |





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#### REQUIREMENTS:

##### 1. GENERAL:

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.

D. PACKAGING AND PACKING: UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING:

- (1) EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT. LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT. BODY MOUNTING SHALL BE SUCH THAT CAPACITORS CAN BE EASILY GRIPPED BY THE BODY AND REMOVED FROM THE PACKAGE. HANDLING OF LEADS IS TO BE HELD TO A MINIMUM.

E. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-18312 EXCEPT AS SPECIFIED HEREIN.

##### 2. INSPECTION AND ACCEPTANCE:

###### A. MECHANICAL REQUIREMENTS:

- (1) DIMENSIONS PER OUTLINE AND TABLE II
- (2) LEAD DATA: NICKEL PER ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
- (3) MARKING: PER ND1002019 EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER, AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. THE MANUFACTURER'S PART OR TYPE NUMBER, CAPACITANCE VALUE, TOLERANCE, AND VOLTAGE RATING MAY APPEAR ON THE PART AND PACKAGE. EACH CONTAINER SHALL ALSO INCLUDE THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER.

###### B. ELECTRICAL REQUIREMENTS:

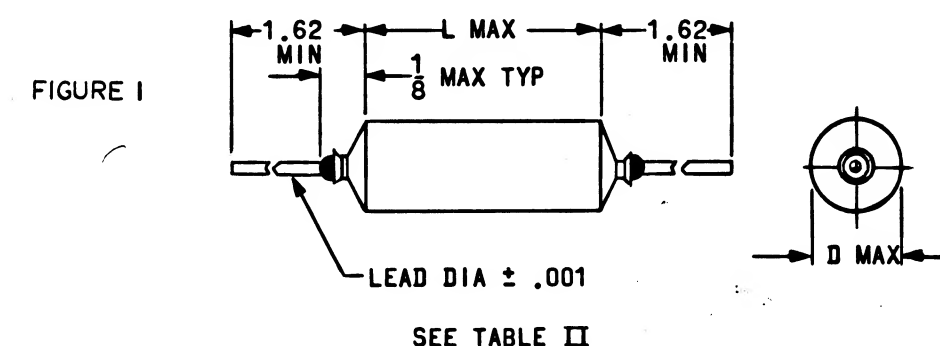
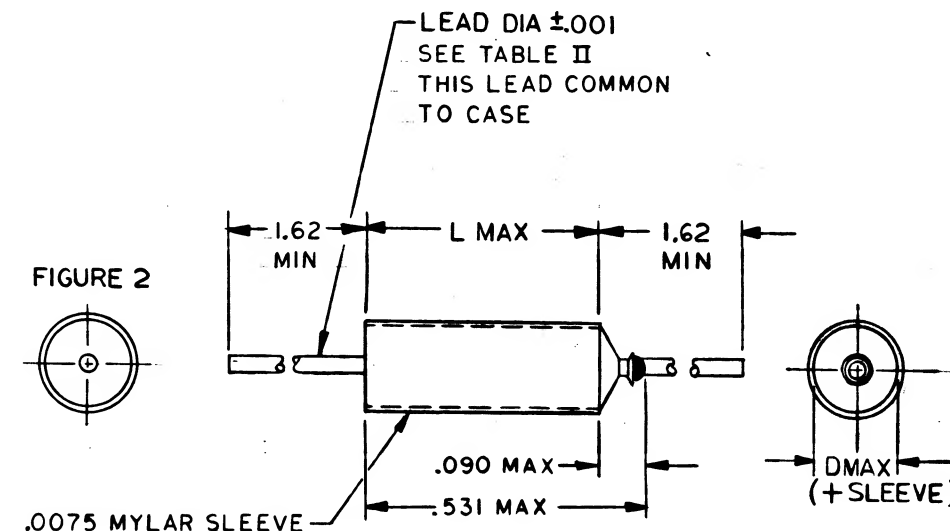
- (1) CAPACITANCE: PER TABLE I AT +25°C. AND  $1000 \pm 100$  CPS FOR VALUES UP TO 1.0 MFD AND  $60 \pm 6$  CPS FOR VALUES GREATER THAN 1.0 MFD.
- (2) CAPACITANCE TOLERANCE:  $\pm 5\%$  AT +25°C AND  $1000 \pm 100$  CPS FOR VALUES UP TO 1.0 MFD AND  $60 \pm 6$  CPS FOR VALUES GREATER THAN 1.0 MFD.

##### 3. DESIGN REQUIREMENTS:

- A. DC WORKING VOLTAGE: PER TABLE AT +125°C.
- B. OPERATING TEMPERATURE RANGE: -55°C TO +125°C.

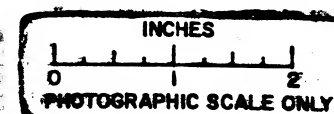
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

| REVISIONS |  |         |          |
|-----------|--|---------|----------|
| SYM       | DESCRIPTION  | DATE    | APPROVAL |
| F         | REPLACES REV E WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02210 | 7/24/63 | WLC      |
| G         | REVISED PER TDRR 04331   | 8/12/63 | WLC      |
| H         | REVISED PER TDRR 04957   | 12/3/63 | WLC      |
| J         | REVISED PER TDRR 05977   | 2/4/64  | WLC      |
| K         | REVISED PER TDRR 08844   | 3/14/64 | WLC      |
| L         | REVISED PER TDRR 13949   | 7-12-64 | WLC      |



REPLACES REV(E) WITH CHANGE

|   |                         |  |                  |
|---|-------------------------|--|------------------|
| QTY REQD  | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.         |
| LIST OF MATERIALS   |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE MASS<br>DWS NO CONTRACT 497                              |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                                   |                  |
| DRAWN D. Doherty DATE 5 JUL 63<br>CHECKED C. F. Pardo 8 JUL 63<br>APPROVAL W. R. Tate 7/24/63 |                         | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, $\pm 5\%$ TOL.) |                  |
| APPROVAL  |                         | SPECIFICATION CONTROL DRAWING  |                  |
| NASA APPROVAL W. R. Tate 7/24/63  |                         | CODE IDENT NO.   | NASA DRAWING NO. |
| MIT APPROVAL W. R. Tate 7/24/63   |                         | C  | 1010264          |
| SCALE NONE  |                         | WT   | SHEET 1 OF 3     |





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#### DESIGN REQUIREMENTS: (CONTINUED)

C. DISSIPATION FACTOR: 1% MAX FOR CASE SIZES D THRU U (SEE TABLE II) AND 1.5% MAX FOR SIZES A, B, AND C; AT +25°C AND 1000 ± 100 CPS FOR VALUES UP TO 1.0 MFD, AND 60 ± 6 CPS FOR VALUES GREATER THAN 1.0 MFD.

#### D. INSULATION RESISTANCE:

(1) AT +25°C: 2000 MEGOHM-MICROFARADS MIN. NEED NOT EXCEED 12,000 MEGOHMS. 3000 MEGOHMS MIN. BETWEEN CASE AND EITHER TERMINAL.

(2) AT +125°C:

(a) FOR 200 VDC UNITS:

10 MEGOHM-MICROFARADS MIN. NEED NOT EXCEED 150 MEGOHMS.

(b) FOR 400 AND 600 VDC UNITS:

40 MEGOHM-MICROFARADS MIN. NEED NOT EXCEED 600 MEGOHMS.

E. TEMPERATURE COEFFICIENT: NON LINEAR, REF FIGURE I FOR TYPICAL CAPACITANCE CHANGE VS TEMPERATURE.

F. CONSTRUCTION: PARTS SHALL BE CONSTRUCTED FROM METALIZED PAPER AND A MINERAL WAX IMPREGNATED POLYESTER FILM. THE CASE SHALL BE A METAL AND SEALED. CONNECTIONS SHALL BE SUCH THAT THE PARTS SHALL BE ESSENTIALLY NON-INDUCTIVE.

G. LEAD STRENGTH: LEADS SHALL WITHSTAND A 5 POUND AXIAL PULL FOR 1 MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

H. ENVIRONMENTAL: PER ND 1002045 IN ADDITION TO THE FOLLOWING:

(a) SEALING TEST: UNITS SHALL GIVE NO INDICATION OF LEAKAGE WHEN TESTED PER METHOD 512, PROCEDURE I OF MIL-STD-810.

(b) REDUCED PRESSURE: UNITS SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10<sup>-4</sup> MM OF MERCURY FOR 96 HOURS.

(c) LIFE: MAXIMUM CAPACITANCE CHANGE DURING LIFE TEST PER ND 1002045, PARAGRAPH 4.2.7.1 SHALL BE ± 5%.

#### 4. SPECIAL CONDITIONING BY SUPPLIER:

A. BURN-IN: ALL CAPACITORS SHALL BE BURNED IN FOR 250 HOURS MINIMUM AT RATED WORKING VOLTAGE AT A TEMPERATURE OF +85°C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

CAPACITANCE

DISSIPATION FACTOR

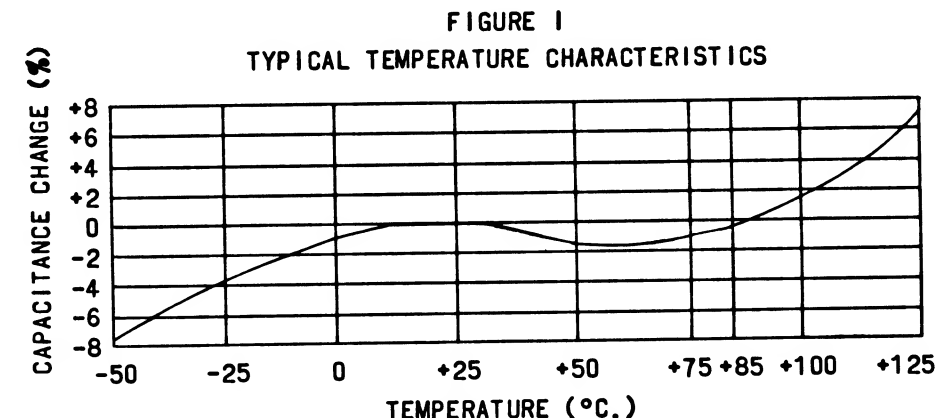
INSULATION RESISTANCE

B. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE. THE BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT.

1010264

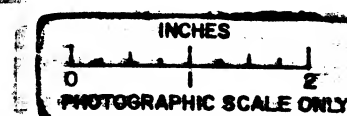
#### REVISIONS

| SYM | DESCRIPTION  | DATE     | APPROVAL |
|-----|--|----------|----------|
| F   | REPLACES REV E WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02210 | 7/24/63  | WR       |
| G   | REVISED PER TDRR 04551   | 11/12/63 | WR       |
| H   | REVISED PER TDRR 04957   |          |          |
| J   | REVISED PER TDRR 05977   |          |          |
| K   | REVISED PER TDRR 08844   | 5/16/64  | WR       |
| L   | REVISED PER TDRR 13949   | 11-13-64 | WR       |



Ⓕ REPLACES REV (E) WITH CHANGE

|  |                         |  |              |
|--|-------------------------|--|--------------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.     |
| LIST OF MATERIALS  |                         |  |              |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>DWG NO. CONTRACT 427   |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                             |              |
| DRAWN <i>B. Boland</i> DATE <i>5/11/63</i><br>CHECKED <i>C.F. Foyda</i> <i>8/11/63</i><br>APPROVAL <i>B. Boland</i> <i>7/24/63</i> |                         | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, ±5% TOL.) |              |
| HEAT TREATMENT   |                         | SPECIFICATION CONTROL DRAWING  |              |
| FINAL FINISH   |                         | NASA DRAWING NO.<br>1010264  |              |
| NEXT ASSY  | USED ON                 | CODE IDENT NO.<br>C  | SIZE<br>1    |
| APPLICATION  |                         | MIT APPROVAL <i>W.C. Foyda</i> <i>7/24/63</i>                          | SHEET 2 OF 3 |



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7 1010264

| REVISIONS |  |          |          |
|-----------|--|----------|----------|
| SYM       | DESCRIPTION  | DATE     | APPROVAL |
| F         | THIS SHEET ADDED AND UPGRADED TO CLASS A RELEASE PER TDRR02210 | 7/24/63  | WK       |
| G         | REVISED PER TDRR 04551   | 11/14/63 | RPE WK   |
| H         | REVISED PER TDRR 04957   | 12/1/63  | RPE WK   |
| J         | REVISED PER TDRR 05977   | 2/4/64   | RPE WK   |
| K         | REVISED PER TDRR 08844   | 4/16/64  | W/L      |
| L         | REVISED PER TDRR 13949   | 11-12-64 | WK       |

TABLE I

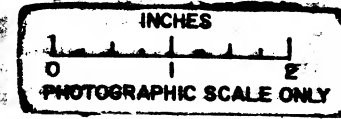
| CAPACITANCE MICROFARADS | 200 VDC  |                      |          | 400 VDC              |          |                      | 600 VDC  |                      |          |
|-------------------------|----------|----------------------|----------|----------------------|----------|----------------------|----------|----------------------|----------|
|                         | DASH NO. | CASE SIZE SEE NOTE 1 | DASH NO. | CASE SIZE SEE NOTE 1 | DASH NO. | CASE SIZE SEE NOTE 1 | DASH NO. | CASE SIZE SEE NOTE 1 | DASH NO. |
| .0010                   | -1       | A                    |          |                      | -75      |                      |          | C                    |          |
| .0012                   | -2       | A                    |          |                      | -76      |                      |          | C                    |          |
| .0015                   | -3       | A                    |          |                      | -77      |                      |          | C                    |          |
| .0018                   | -4       | A                    |          |                      | -78      |                      |          | C                    |          |
| .0022                   | -5       | A                    |          |                      | -79      |                      |          | C                    |          |
| .0027                   | -6       | A                    |          |                      | -80      |                      |          | C                    |          |
| .0033                   | -7       | A                    |          |                      | -81      |                      |          | C                    |          |
| .0039                   | -8       | A                    |          |                      | -82      |                      |          | D                    |          |
| .0047                   | -9       | A                    |          |                      | -83      |                      |          | D                    |          |
| .0056                   | -10      | A                    |          |                      | -84      |                      |          | D                    |          |
| .0068                   | -11      | A                    |          |                      | -85      |                      |          | D                    |          |
| .0082                   | -12      | A                    |          |                      | -86      |                      |          | D                    |          |
| .010                    | -13      | A                    | -47      | D                    | -87      |                      |          | D                    |          |
| .012                    | -14      | B                    | -48      | D                    | -88      |                      |          | D                    |          |
| .015                    | -15      | B                    | -49      | D                    | -89      |                      |          | D                    |          |
| .018                    | -16      | C                    | -50      | D                    | -90      |                      |          | E                    |          |
| .022                    | -17      | C                    | -51      | D                    | -91      |                      |          | E                    |          |
| .027                    | -18      | C                    | -52      | E                    | -92      |                      |          | E                    |          |
| .033                    | -19      | C                    | -53      | E                    | -93      |                      |          | E                    |          |
| .039                    | -20      | D                    | -54      | G                    | -94      |                      |          | G                    |          |
| .047                    | -21      | D                    | -55      | G                    | -95      |                      |          | G                    |          |
| .056                    | -22      | D                    | -56      | G                    | -96      |                      |          | G                    |          |
| .068                    | -23      | D                    | -57      | G                    | -97      |                      |          | G                    |          |
| .082                    | -24      | D                    | -58      | H                    | -98      |                      |          | H                    |          |
| .100                    | -25      | D                    | -59      | H                    | -99      |                      |          | H                    |          |
| .120                    | -26      | E                    | -60      | H                    | -100     |                      |          | J                    |          |
| .150                    | -27      | E                    | -61      | H                    | -101     |                      |          | J                    |          |
| .180                    | -28      | F                    | -62      | K                    | -102     |                      |          | K                    |          |
| .220                    | -29      | F                    | -63      | K                    | -103     |                      |          | K                    |          |
| .270                    | -30      | G                    | -64      | L                    | -104     |                      |          | L                    |          |
| .330                    | -31      | G                    | -65      | L                    | -105     |                      |          | L                    |          |
| .390                    | -32      | H                    | -66      | M                    | -106     |                      |          | M                    |          |
| .470                    | -33      | H                    | -67      | M                    | -107     |                      |          | M                    |          |
| .560                    | -34      | H                    | -68      | N                    | -108     |                      |          | N                    |          |
| .680                    | -35      | H                    | -69      | N                    | -109     |                      |          | N                    |          |
| .820                    | -36      | J                    | -70      | P                    | -110     |                      |          | R                    |          |
| 1.0                     | -37      | J                    | -71      | P                    | -111     |                      |          | R                    |          |
| 1.5                     | -38      | L                    | -72      | R                    | -112     |                      |          | R                    |          |
| 2.0                     | -39      | M                    | -73      | R                    | -113     |                      |          | S                    |          |
| 2.5                     |          |                      |          |                      | -114     |                      |          | U                    |          |
| 3.0                     | -40      | N                    | -74      | U                    |          |                      |          |                      |          |
| 4.0                     | -41      | P                    |          |                      |          |                      |          |                      |          |
| 5.0                     | -42      | R                    |          |                      |          |                      |          |                      |          |
| 6.0                     | -43      | R                    |          |                      |          |                      |          |                      |          |
| 8.0                     | -44      | R                    |          |                      |          |                      |          |                      |          |
| 10.0                    | -45      | T                    |          |                      |          |                      |          |                      |          |
| 12.0                    | -46      | U                    |          |                      |          |                      |          |                      |          |
| 2.7                     | -115     | N                    |          |                      |          |                      |          |                      |          |
| 1.25                    | -116     | L                    |          |                      |          |                      |          |                      |          |
| 0.027                   | -117     | V                    |          |                      |          |                      |          |                      |          |
| .010                    | -118     | W                    |          |                      |          |                      |          |                      |          |

NOTES: 1. SEE TABLE II FOR CASE DIAMETER AND LENGTH.

TABLE II

| CASE SIZE | D     | L     | LEAD DIAMETER |
|-----------|-------|-------|---------------|
| A         | .191  | .781  | .020          |
| B         | .211  | .781  | .020          |
| C         | .251  | .781  | .025          |
| D         | .328  | .875  | .025          |
| E         | .328  | 1.093 | .025          |
| F         | .416  | .875  | .032          |
| G         | .416  | 1.093 |               |
| H         | .516  | 1.093 |               |
| J         | .578  | 1.093 |               |
| K         | .578  | 1.406 |               |
| L         | .578  | 1.656 |               |
| M         | .686  | 1.656 |               |
| N         | .686  | 1.906 |               |
| P         | .766  | 1.906 |               |
| R         | 1.016 | 1.906 |               |
| S         | 1.016 | 2.156 |               |
| T         | 1.016 | 2.406 |               |
| U         | 1.016 | 2.656 | .032          |
| V         | .250  | .437  | .025          |
| W         | .191  | .562  | .025          |

|  |                         |  |                  |
|--|-------------------------|--|------------------|
| QTY REQD   | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO.         |
| LIST OF MATERIALS  |                         |  |                  |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS<br>CONTRACT 497   |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                             |                  |
| DRAWN BY: <i>D. D. Dole</i> DATE: 5 JUL 63<br>CHECKED BY: <i>C. F. Pender</i> 8 JUL 63<br>APPROVAL BY: <i>A. G. Test</i> 7/24/63 |                         | CAPACITOR, FIXED,<br>(METALIZED PAPER PLUS MYLAR,<br>+125°C, ±5% TOL.) |                  |
| NASA APPROVAL: <i>W. H. Puffer</i> 7/24/63   |                         | CODE IDENT NO.   | NASA DRAWING NO. |
| MIT APPROVAL: <i>W. H. Puffer</i> 7/24/63  |                         | C  | 1010264          |
| SCALE  |                         | WT   | SHEET 3 OF 3     |



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#### NOTES:

##### 1. REQUIREMENTS:

A. RATINGS: CONTINUOUS WORKING VOLTAGE AT 125°C; SEE TABLE I  
MAXIMUM CURRENT; 1 AMPERE  
OPERATING TEMPERATURE RANGE; -55 TO +125°C

B. INSULATION RESISTANCE:  
AT 25°C; INSULATION RESISTANCE X CAPACITANCE = 2000 MEGOHM - MICROFARADS MINIMUM UP TO A PERMISSIBLE MAXIMUM OF 12,000 MEGOHMS INSULATION RESISTANCE. 3000 MEGOHMS MINIMUM BETWEEN CASE AND EITHER TERMINAL.  
AT 125°C; INSULATION RESISTANCE X CAPACITANCE = 10 MEGOHM-MICROFARADS (200 VDC) OR 40 MEGOHM - MICROFARADS (400 OR 600 VDC) MINIMUM UP TO A PERMISSIBLE MAXIMUM OF 150 MEGOHMS (200 VDC) OR 600 MEGOHMS (400 OR 600 VDC) INSULATION RESISTANCE.

C. POWER FACTOR: 1% MAXIMUM FOR CASE SIZES D THRU U (SEE TABLE II) AND 1.5% MAXIMUM FOR SIZES A, B, AND C.

D. CONSTRUCTION: PARTS SHALL BE CONSTRUCTED FROM METALIZED PAPER AND A MINERAL WAX IMPREGNATED POLYESTER FILM. THE CASE SHALL BE OF METAL AND SEALED. CONNECTIONS SHALL BE SUCH THAT THE PARTS SHALL BE ESSENTIALLY NON-INDUCTIVE.

E. LEAD MATERIAL: LEADS SHALL BE PURE NICKEL IN ACCORDANCE WITH ND 1015400.

F. LEAD STRENGTH: LEADS SHALL WITHSTAND A 5 POUND AXIAL PULL FOR 1 MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

G. ENVIRONMENTAL TESTS: CAPACITORS SHALL BE CAPABLE OF MEETING ALL ENVIRONMENTAL REQUIREMENTS OF MIL-C-25, ND 1002000.

H. MARKING: EACH CAPACITOR SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL AND PART NUMBER, CAPACITANCE VALUE, TOLERANCE, AND VOLTAGE RATING. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING AND DASH NUMBER TOGETHER WITH THE REVISION.

J. QUALITY ASSURANCE: SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS OF ND 1015400, CLASS II IN ADDITION TO THIS DRAWING AND MIL-C-25.

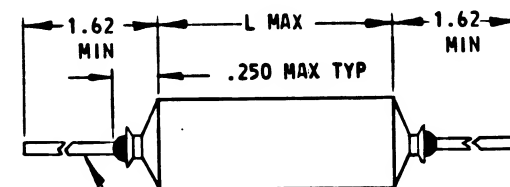
2. INTERPRET THIS DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

3. NOTE - WHEN ORDERING PARTS, SPECIFY MANUFACTURER PART NUMBER PLUS NICKEL LEADS IN ACCORDANCE WITH ND 1015400.

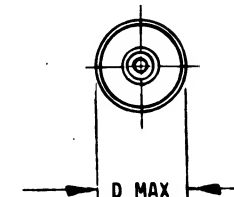
#### ORIGINAL SOURCE OF SUPPLY:

SPRAGUE ELECTRIC CO.  
NO. ADAMS, MASS.  
CODE IDENT NO. 56289

|             |         |  |
|-------------|---------|--|
|             |         | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES |
|             |         | TOLERANCES ON  |
|             |         | FRACTIONS DECIMALS ANGLES                              |
|             |         | ± ± ±  |
|             |         | DO NOT SCALE THIS DRAWING                              |
|             |         | MATERIAL   |
|             |         | SEE NOTES  |
|             |         | HEAT TREATMENT   |
|             |         | NONE   |
|             |         | FINAL FINISH   |
|             |         | NONE   |
| NEXT ASSY   | USED ON |  |
| APPLICATION |         |  |



DIA ± .001  
SEE TABLE II



## FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00295 DATE 23 Jan 1963

|  |                         |  |          |
|--|-------------------------|--|----------|
| QTY REQD                                       | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION  | FIND NO. |
| LIST OF MATERIALS                              |                         |  |          |
| MIT INSTRUMENTATION LAB<br>CAMBRIDGE, MASS.    |                         | MANNED SPACECRAFT CENTER<br>HOUSTON, TEXAS                                     |          |
| DRAWN <u>[Signature]</u> DATE <u>23 Jan 63</u> |                         | CAPACITOR FIXED,<br>METALIZED PAPER PLUS FILM<br>SPECIFICATION CONTROL DRAWING |          |
| CHECKED <u>[Signature]</u> 9 Jan 63            |                         |  |          |
| APPROVAL <u>[Signature]</u> 23 Jan 63          |                         |  |          |
| NASA APPROVAL <u>[Signature]</u> 23 Jan 63     |                         | CODE IDENT NO.   | SIZE     |
| MIT APPROVAL <u>[Signature]</u> 23 Jan 63      |                         | C  | C        |
|  |                         | SCALE NONE   | WT       |
|  |                         | SHEET 1 OF 2   |          |

NASA DRAWING NO.  
**1010264**

4

3

2

1

1010264

REVISIONS

SYN

DESCRIPTION

DATE

APPROVAL

TABLE II

| CAPACITANCE<br>MICROFARADS<br>TOL = ±5% | 200 VDC     |                                |               | 400 VDC     |                                |               | 600 VDC     |                                |               |
|---|-------------|--------------------------------|---------------|-------------|--------------------------------|---------------|-------------|--------------------------------|---------------|
|   | DASH<br>NO. | MANUFACTURER'S<br>PART NO. *** | CASE<br>SIZE* | DASH<br>NO. | MANUFACTURER'S<br>PART NO. *** | CASE<br>SIZE* | DASH<br>NO. | MANUFACTURER'S<br>PART NO. *** | CASE<br>SIZE* |
| .0010                                   | -1          | 118P10252S2                    | A             | ---         | ---                            | ---           | -75         | 118P10256S2                    | C             |
| .0012                                   | -2          | 118P12252S2                    | A             | ---         | ---                            | ---           | -76         | 118P12256S2                    | C             |
| .0015                                   | -3          | 118P15252S2                    | A             | ---         | ---                            | ---           | -77         | 118P15256S2                    | C             |
| .0018                                   | -4          | 118P18252S2                    | A             | ---         | ---                            | ---           | -78         | 118P18256S2                    | C             |
| .0022                                   | -5          | 118P22252S2                    | A             | ---         | ---                            | ---           | -79         | 118P22256S2                    | C             |
| .0027                                   | -6          | 118P27252S2                    | A             | ---         | ---                            | ---           | -80         | 118P27256S2                    | C             |
| .0033                                   | -7          | 118P33252S2                    | A             | ---         | ---                            | ---           | -81         | 118P33256S2                    | C             |
| .0039                                   | -8          | 118P39252S2                    | A             | ---         | ---                            | ---           | -82         | 118P39256S2                    | D             |
| .0047                                   | -9          | 118P47252S2                    | A             | ---         | ---                            | ---           | -83         | 118P47256S2                    | D             |
| .0056                                   | -10         | 118P56252S2                    | A             | ---         | ---                            | ---           | -84         | 118P56256S2                    | D             |
| .0068                                   | -11         | 118P68252S2                    | A             | ---         | ---                            | ---           | -85         | 118P68256S2                    | D             |
| .0082                                   | -12         | 118P82252S2                    | A             | ---         | ---                            | ---           | -86         | 118P82256S2                    | D             |
| .010                                    | -13         | 118P10352S2                    | A             | -47         | 118P10354S2                    | D**           | -87         | 118P10356S2                    | D             |
| .012                                    | -14         | 118P12352S2                    | B             | -48         | 118P12354S2                    | D**           | -88         | 118P12356S2                    | D             |
| .015                                    | -15         | 118P15352S2                    | B             | -49         | 118P15354S2                    | D**           | -89         | 118P15356S2                    | D             |
| .018                                    | -16         | 118P18352S2                    | C             | -50         | 118P18354S2                    | D             | -90         | 118P18356S2                    | E             |
| .022                                    | -17         | 118P22352S2                    | C             | -51         | 118P22354S2                    | D             | -91         | 118P22356S2                    | E             |
| .027                                    | -18         | 118P27352S2                    | C             | -52         | 118P27354S2                    | E**           | -92         | 118P27356S2                    | E             |
| .033                                    | -19         | 118P33352S2                    | C             | -53         | 118P33354S2                    | E**           | -93         | 118P33356S2                    | E             |
| .039                                    | -20         | 118P39352S2                    | D             | -54         | 118P39354S2                    | G**           | -94         | 118P39356S2                    | G             |
| .047                                    | -21         | 118P47352S2                    | D             | -55         | 118P47354S2                    | G**           | -95         | 118P47356S2                    | G             |
| .056                                    | -22         | 118P56352S2                    | D             | -56         | 118P56354S2                    | G**           | -96         | 118P56356S2                    | G             |
| .068                                    | -23         | 118P68352S2                    | D             | -57         | 118P68354S2                    | G**           | -97         | 118P68356S2                    | G             |
| .082                                    | -24         | 118P82352S2                    | D             | -58         | 118P82354S2                    | H**           | -98         | 118P82356S2                    | H             |
| .100                                    | -25         | 118P10452S2                    | D             | -59         | 118P10454S2                    | H**           | -99         | 118P10456S2                    | H             |
| .120                                    | -26         | 118P12452S2                    | E             | -60         | 118P12454S2                    | H             | -100        | 118P12456S2                    | J             |
| .150                                    | -27         | 118P15452S2                    | E             | -61         | 118P15454S2                    | H             | -101        | 118P15456S2                    | J             |
| .180                                    | -28         | 118P18452S2                    | F             | -62         | 118P18454S2                    | K**           | -102        | 118P18456S2                    | K             |
| .220                                    | -29         | 118P22452S2                    | F             | -63         | 118P22454S2                    | K**           | -103        | 118P22456S2                    | K             |
| .270                                    | -30         | 118P27452S2                    | G             | -64         | 118P27454S2                    | L**           | -104        | 118P27456S2                    | L             |
| .330                                    | -31         | 118P33452S2                    | G             | -65         | 118P33454S2                    | L**           | -105        | 118P33456S2                    | L             |
| .390                                    | -32         | 118P39452S2                    | H             | -66         | 118P39454S2                    | M**           | -106        | 118P39456S2                    | M             |
| .470                                    | -33         | 118P47452S2                    | H             | -67         | 118P47454S2                    | M**           | -107        | 118P47456S2                    | M             |
| .560                                    | -34         | 118P56452S2                    | H             | -68         | 118P56454S2                    | N**           | -108        | 118P56456S2                    | N             |
| .680                                    | -35         | 118P68452S2                    | H             | -69         | 118P68454S2                    | N**           | -109        | 118P68456S2                    | N             |
| .820                                    | -36         | 118P82452S2                    | J             | -70         | 118P82454S2                    | P             | -110        | 118P82456S2                    | R             |
| 1.0                                     | -37         | 118P10552S2                    | J             | -71         | 118P10554S2                    | P             | -111        | 118P10556S2                    | R             |
| 1.5                                     | -38         | 118P15552S2                    | L             | -72         | 118P15554S2                    | R**           | -112        | 118P15556S2                    | R             |
| 2.0                                     | -39         | 118P20552S2                    | M             | -73         | 118P20554S2                    | R             | -113        | 118P20556S2                    | S             |
| 2.5                                     | ---         | ---                            | ---           | ---         | ---                            | ---           | -114        | 118P25556S2                    | U             |
| 3.0                                     | -40         | 118P30552S2                    | N             | -74         | 118P30554S2                    | U             | ---         | ---                            | ---           |
| 4.0                                     | -41         | 118P40552S2                    | P             | ---         | ---                            | ---           | ---         | ---                            | ---           |
| 5.0                                     | -42         | 118P50552S2                    | R             | ---         | ---                            | ---           | ---         | ---                            | ---           |
| 6.0                                     | -43         | 118P60552S2                    | R             | ---         | ---                            | ---           | ---         | ---                            | ---           |
| 8.0                                     | -44         | 118P80552S2                    | R             | ---         | ---                            | ---           | ---         | ---                            | ---           |
| 10.0                                    | -45         | 118P10652S2                    | T             | ---         | ---                            | ---           | ---         | ---                            | ---           |
| 12.0                                    | -46         | 118P12652S2                    | U             | ---         | ---                            | ---           | ---         | ---                            | ---           |

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QTY REQD

PART OR IDENTIFYING NO.

NOMENCLATURE OR DESCRIPTION

FIND NO.

LIST OF MATERIALS

MIT INSTRUMENTATION LAB

CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER

HOUSTON, TEXAS

CAPACITOR, FIXED, METALIZED PAPER PLUS FILM

SPECIFICATION CONTROL DRAWING

HEAT TREATMENT

NASA APPROVAL

MIT APPROVAL

CODE IDENT NO.

SIZE

NASA DRAWING NO.

SCALE

WT

SHEET 2 OF 2